THE ENGINEERING AND MINING JOURNAL

Entered at the Post-Office of New York, N. Y., as Second-Class Mail Matter.

VOL. LI. FEBRUARY 21. No. 8.

RICHARD P. ROTHWELL, C.E, M.E., Editor.

ROSSITER W. RAYMOND Ph.D., M.E. Special Contributor.

Cable Address: "Rothwell, New York." Use A. B. C. Code, Fourth Editior.
London: 76 Finsbury Pavement, London, E. C., Mr. Thomas B. Provis, Civil and Mining Engineer, Manager.

Mexico: Mr. R. E. Chism, M. E., Callejon Espiritu Santo No. 4, City of Mexico.
Peru, S. A.: Mr. John Newton, No. 2 Calle Constitucion, Calla.
Australasia: Messrs. Moffat, Judd & Co., 11 Bridge street, Sydney, N. S. W.; Mr. W. Forster, 56 Elizabeth street, Melbourne, Victoria; Messrs. J. T. Partridge & Co., 134 Manchester street, Christchurch, New Zealand.

SUBSCRIPTION PRICE, including postage:
Weekly Edition (which includes the Export Edition), for the United States, Mexico and Canada, $4 per annum; $2.25 for six months; all other countries in the Postal Union, $5.
Monthly Export Edition, all countries, $2.50 gold value per annum.
REMITTANCES should always be made by Bank Drafts, Post-Office Orders or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING CO. All payments must be made in advance.

THE SCIENTIFIC PUBLISHING CO., Publishers,
SOPHIA BRAEUNLICH, Sec'y & Treas. R. P. ROTHWELL. Pres. and Gen'l Manager.
P.O. Box 1833. 27 Park Place, New York.

CONTENTS.

	PAGE.
Index to Volume Fifty	227
The Imperatori Process	227
Importation of Mexican Lead	227
Rapid Transit in New York	227
Lead Statistics	227
The Alaska "Bubbles"	227
The Comstock Mill Scandal	228
The Iron Market	228
The Precipitation of Gold from Chloride Solutions	229
Tin in Central Texas	229
The Atlantic-Pacific Railway Tunnel	229
Pyritic Smelting	229
Direct Combination of Iron and Carbon	229
The Incubation of More Alaska Bubbles	230
Transactions of Engineering Societies	230
*Amalgamation at the Comstock Lode, Nevada.—II.	231
The Calculation of the Blast in Iron Furnaces	223
Howe's Metallurgy of Steel	234
Moore's Volumetric Estimation of Manganese	234
American Institute of Mining Engineers	234
The Onondaga Salt Wells in 1890	235
The Inspection of Materials of Construction in the United States.—I.	235
Official Statements	236
*Reno Rapid Transit Tunnel System.	237
Invention of the Compass	237
Census Bulletins on the Coal Industry in 1889	238
Spanish Mercury Mines	238
Increased Use of Compound Locomotives	238
Presentation of Note	238
Patents Granted	238
Personals	239
Obituary	239
Societies	239
Industrial Notes	239
Machinery and Supplies Wanted	240

* Illustrated.

MINING NEWS:
Alabama 240
Alaska 240
Arizona 240
California 240
Colorado 241
Florida 241
Georgia 241
Idaho 241
Kansas 241
Michigan 241
Minnesota 242
Missouri 242
Montana 242
Nevada 242
New Mexico 243
North Carolina 243
Pennsylvania 243
South Dakota 244
Utah 244
Virginia 244
Washington 244
West Virginia 244
Wisconsin 244
Wyoming 244

FOREIGN:
Nova Scotia 244

MEETINGS 245
DIVIDENDS 245
ASSESSMENTS 245

MINING STOCK MARKETS:
New York 245
Boston 245
Lake Superior Gold and Iron Stocks 245
San Francisco 245
Pipe Line 245

MINING STOCK TABLES:
Baltimore 252
Birmingham 252
Boston 251
Coal Stocks 251
London 252
New York 251
Paris 252
Pittsburg 252
San Francisco 251
St. Louis 252
Trust Stocks 252

MARKETS:
COAL:
New York 246
Boston 247
Buffalo 247
Chicago 247
Pittsburg 247

METALS 247
IRON:
New York 248
Chicago 248
Cleveland 248
Philadelphia 248
Pittsburg 248

CHEMICALS AND MINERALS 249

BUILDING MATERIAL MARKET. 249
CURRENT PRICES:
Chemicals 252
Minerals 252
Rarer Metals. 252
Building Mat'l. 252
ADV. INDEX xxi

THE index to the ENGINEERING AND MINING JOURNAL, Vol. L—July to December, 1890—is mailed to all subscribers with this issue.

WE are glad to learn that some experiments are shortly to be tried with the Imperatori process at open-hearth steel works in this country, under the direction of Messrs. ROSSI and NAU, who are the American agents for it. The process, which has already been described in these columns, consists essentially in adding to the molten pig iron in the open-hearth furnace briquettes of fine iron ore mixed with coal. The coal reduces the ore, nearly the whole of whose iron is recovered.

THE importation from Mexico of lead contained in silver ores in 1890 amounted to 18,124 tons, as we are officially informed by the Treasury Department in Washington. This is 1,876 tons less than we had estimated in our statistics published January 3d, 1891. There were some small imports of other lead-bearing ores in 1890, which would probably make up the total imports in ore to more than 20,000 net tons. As the total United States production of lead in 1890 was 187,000 tons, the output from native ores amounted to 167,000 tons of 2,000 pounds, or about 4,000 tons less than in 1889.

THE Rapid Transit question in New York is attracting a little of the attention its importance deserves. A number of plans have been submitted, and it is safe to say that each presents some advantages over all the others and some disadvantages that need careful weighing.

The need of rapid transit is admitted everywhere. The question is to find the best plan which can be carried out at a cost not prohibitive.

No plan which contemplates tearing up the streets in the lower part of the city should be entertained, for this is quite unnecessary, and no plan which will not give both through and local trains, and easy access to them, will fulfil the requirements. Safety, speed, facility of access, comfort to passengers and economy in original cost, which necessarily limits cost of transportation, are the essential conditions, and it is probable that the road which will best unite these will borrow some special feature from each of the plans submitted.

WE have deep sympathy for our esteemed contemporary the Denver *Mining Industry and Tradesman*. It did its best, in the interest of the car bonate ring, to persuade the Colorado silver miners that the exclusion of Mexican lead fluxing ores would bring them boundless prosperity, and the object having been partially accomplished by the McKinley bill, our contemporary is confronted with a state of affairs the very opposite of its glowing promises. The lead production of the country has actually decreased under its Chinese policy, and smelting charges on silver ores have been increased so tremendously that the silver miners are getting their eyes opened and cannot be deceived much longer.

The *Mining Industry and Tradesman* must feel some mortification at the great injury its short-sighted policy has done the great majority of the western miners, and we doubt if the substantial gratitude it received from the few monopolists when they were expecting favors, compensates for present widespread discredit. In any event, it should remember that to descend to vulgar abuse of the ENGINEERING AND MINING JOURNAL, because events have as fully confirmed the correctness of our advice as they have condemned, that of the *Mining Industry and Tradesman* merely shows ill temper and irritation and misleads no one. It would be more honest and manly to frankly admit it was in the wrong and to now advocate the true course which will benefit the miners it formerly deluded. To charge us with "falsehood" and "stupidity" and with "doctoring statistics" is very bad manners, and not at all in keeping with the reputation it had gained for courtesy.

The statistics we have published are, as we stated, in all cases official returns from the producers, and are, we believe, accurate, for the producers are interested in having correct returns published, and are incapable of furnishing untruthful reports of their own production.

The idea of a newspaper setting up its wild guess at what the production of lead in this country has been against the official returns of every smelter and refiner, is too silly to call for comment.

THE ALASKA "BUBBLES."

In the issue of the ENGINEERING AND MINING JOURNAL of December 20th, 1890, was published a letter from a correspondent in Alaska, exposing the extravagant claims of the Silver Bow Basin Mining Company, floated by T. S. Nowell, whose record as a "bubble blower" is well known to readers of the ENGINEERING AND MINING JOURNAL. The arrival in Juneau, Alaska, of the issue of the ENGINEERING AND MINING JOURNAL containing this communication was made the occasion of organizing an "indignation meeting" by the Nowell clique for the purpose of counteracting, if possible, the effect of the exposure. The meeting was largely attended by the citizens of Juneau, and a committee was appointed to draft resolutions and report in "thirty minutes." There solutions, which seem to have been prepared for New England consumption, were passed by a vote of six persons, the balance of the citizens condemning them by their discrete and eloquent silence. Our space does not permit printing them in full, but their burden is as follows:

WHEREAS, Certain articles have appeared in the eastern press derogatory to the interests of all residents who are interested in the development of mining properties in this territory, and, WHEREAS, A certain article in the ENGINEERING AND MINING JOURNAL has been found to be untrue in all essential particulars and the patience of a long-suffering public exhausted; it is RESOLVED, That the said article is untrue in all of its essential particulars, and evidently is the results of continual brooding by a diseased and enfeebled mind over its own personal grievances, either real or fancied; that its learned dissertations upon the merits and demerits of the Silver Bow Basin are only fancies of the correspondent's brain; that as mining men, and men familiar with the camp—we believe the property to be valuable, the work done by the company first-class, and we have great faith in the property; that inasmuch as both Mr. Thos. S. Nowell and Mr. John A. Bernhardt have made investments of capital in mining properties among us and have been and now are carrying forward work and expending large sums of money in development and improvements whereby the mining interests of this country are being opened, all of which is beneficial to the general mining industry, we, therefore, denounce the article in question as false and libelous, and the author an enemy of the community.

In the words of a local newspaper, there was considerable "paid wind" blowing about this meeting. We believe that this is the first case on record where it took a party of interested citizens so long as thirty minutes even to decide that a mining scheme which puts money into their own pockets was a legitimate undertaking that deserved the support of every "tenderfoot" who had any cash to invest.

OUR correspondent has favored us with a communication, printed on another page, which, we have good reason to believe, describes the circumstances faithfully. He has earned by his courage in exposing the hollowness of the claims of this scheme the gratitude of all who desire

to see mining enterprises become popular, because profitable, investments for capital.

The ENGINEERING AND MINING JOURNAL has been since its first issue determined to expose all transactions which throw discredit upon the mining industry, and has always been ready to encourage legitimate undertakings. The Silver Bow Basin Mining Company, though not so absolutely worthless as Mr. NOWELL's last Alaska scheme, the "Alaska Union," is still a mere "bubble" when its merits are compared with the claims made by its experienced and plausible "blower."

THE COMSTOCK MILL SCANDAL.

The reports of the superintendents of the various bullion-producing mines on the Comstock lode for the quarter ending December 31st, 1890, which we give in our pages of general mining news, show that although bullion to the amount of $842,439 was produced by 13 mines, the cost of production, including mining, transportation and reduction expenses, was $1,024,814. One company only, the Occidental Consolidated, paid more than operating expenses, its bullion yield being $2,317 greater than the cost of production. Thus the net loss to shareholders of these companies for the quarter was, in round numbers, $180,000. The net loss for the previous quarter was $152,392, the value of bullion produced having been $1,001,323, and the total production for the year $4,052,107.

Of course, from the manner in which these returns are prepared, which has been described in previous numbers of the ENGINEERING AND MINING JOURNAL, the only thing hown by them is the profit and loss account of the shareholders not included within the mystic circle of the mill ring. What was the actual production of the Comstock mines in 1890, or in previous years, as far back as 1864, has been known only to this gang of rascals, but is now being shown in the California courts.

The fact that the members of the ring have all grown rich, while outside stockholders have been paying assessments, is evidence of the profit which the former have found in the business. In 1889, the Consolidated California & Virginia Mining Company made a pretense of giving its shareholders their due by declaring dividends, which would have been respectable were it not known that they should have been much larger. In 1890, out of a bullion production of $1,585,663, as returned, not only was it found impossible to make a profit of one penny, but an actual loss of $14,765 was incurred. Is there a mine in the country, away from the Comstock, whose directors would have the effrontery to present the public with such a disgraceful statement as this?

How long will Comstock shareholders, gamblers though many of them may be, continue to permit themselves to be "mulcted" in this manner by the swindling mill ring? There is evidence that they are now becoming tired of it, and the proprietors of the game are endeavoring to induce them to continue, offering them the enticement of a new deal. Deep mining is again to be undertaken, with the possibility of uncovering new bonanzas. Operating expenses and tunnel royalties are to be reduced so that the immense amount of low grade ore in sight in the mines, hitherto impossible to work at profit, may now be handled with good returns—to the mill ring. It is the same old story of the spider and the fly. The same marked cards are to be used in this game as in the others of former years. The only satisfaction which the shareholders of Comstock mining companies will derive from again embarking in deep mining is that they will drop their money into deeper holes than they do now.

What Comstock shareholders most need is honest mine management, and the proven rascality of the present mill ring, headed by a United States Senator, forbids any hope except by bringing the culprits to justice. Let all Comstock shareholders unite their efforts to this end, and they will certainly get a good dividend out of the thieves, and probably many out of the mines when honestly managed.

THE IRON MARKET.

The price of pig iron has been steadily declining during the past three years, until within the last three months it has reached a point nearly as low as that to which it dropped during the hard times following the panic of 1873. The conditions which prevail at the present time, however, are very different from those which were ruling then. The price of labor and nearly everything else was depressed at that time, while the present decade, aside from the disturbances which have recently been occasioned by threatening silver legislation, and the consequent financial stringency, has been one of general business prosperity.

The recent decline in the price of iron is evidently due, then, to entirely different causes than those which affected the market fifteen years ago.

A general impression seems to prevail in the iron trade, at the present time, that prices have practically reached the bottom point, but with a situation of affairs such as exists we much fear that this may not be the case, and, in any event, it would be idle to look for any increase for months to come. At the close of 1890 there were unsold stocks of pig iron in warrant yards and makers' hands to the amount of 741,281 net tons. The consumption of iron during the year 1890 had been exceptionally large, but the production had been larger notwithstanding the fact that a number of furnaces in the Birmingham district of Alabama had been out of blast during the last quarter of the year on account of a strike of miners and furnacemen. The Lake Superior mines had increased their production in a reckless manner, and at the close of the year there were certainly more than 1,200,000 tons unsold at Lake Erie ports.

With the month of January, production was largely decreased, and a number of furnaces in the Mahoning and Shenango Valleys blew out. The market price of iron had fallen to very near, and in some cases quite down to, the cost of production in these places, and it was necessary that the iron masters should take steps toward a readjustment of schedules, obtaining reductions in the price of ore, coke, lime-stone freight rates, etc. Failing in this, the closing down was determined and 10,000 men were thrown out of employment.

It was not only the furnacemen of Ohio who were feeling the effects of the condition of the market so keenly. Iron works and rolling mills all over Pennsylvania were obliged to make reductions in wages, as was the case also in the Connellsville coke region which has resulted in a strike of immense proportions. In the Lake Superior iron-ore mines, wages have been very heavily reduced, in some cases as much at 20 to 25 per cent., and the cost of ore will be greatly reduced this year.

The fundamental cause of the existing situation has been the competition of the Southern furnaces. A large number of these, erected solely to form the nucleus of a town site boom, having fallen into difficulty during the financial stringency of the past months, have been pouring iron into Northern markets at almost any price, in order to raise money to meet their obligations. As we are reliably informed, several important lots of Southern gray forge iron have been sold, at the furnace, at a price as low as $9 per ton. There is no competition as severe as that of a bankrupt concern, and some of the Southern furnaces are certainly not strong financially.

It will not be until business again becomes settled and production resumes its natural course that the price of pig iron is likely to become firm again. With the capacity for production so much greater than present consumption, with ore, coke, transportation, and wages declining, and furnaces blowing in there is not much probability that prices will permanently go much higher, and the prospects are that temporarily they may go lower than they have been.

Notwithstanding these circumstances, however, the rolling mills have seen fit to increase the price of steel rails, and for these, which two months ago could be purchased for $28, they now demand $30. The officers of the steel companies deny that a combination has been effected between them, but only an arrangement to regulate output and prices. In other words, it is a trust in all but name and organization. We shall watch with interest this attempt to control market prices in defiance of all natural conditions.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and that of book buyers, give the retail price?—These notices do not supersede review in another page of the Journal.]

Annual Report and Statement of the Chief of the Bureau of Statistics on the Foreign Commerce and Navigation, Immigration and Tonnage of the United States for the year ending June 30th, 1890. 1,026 pages. Published by the Government. Washington, 1891.

Irrigation Development. History, customs, laws and administration systems relating to irrigation, water courses and waters in France, Italy, and Spain. The introductory part of the Report of the State Engineer of California on Irrigation and the Irrigation Question. By Wm. Ham. Hall, C. E., State Engineer. 622 pages. Published by California State. Sacramento.

Irrigation in California [Southern]. The field, water supply, and works, organization and operation in San Diego, San Bernardino and Los Angeles counties. The second part of the Report of the State Engineer of California on Irrigation and the Irrigation Question. By Wm. Ham. Hall, C. E., State Engineer. 672 pages. Illustrated. Published by California State. Sacramento.

Maps of the United States showing Central Station Plants and Electric Railway Systems in operation. Thomson-Houston Electric Company, publishers. Boston, Mass., 1891.

Preliminary Survey and Estimates. By Theodore Graham Gribble, C. E. 420 pages. Illustrated. Longmans, Green & Co., London and New York, 1891. Price, $2.25.

The American Patent System. A practical guide to the inventor and to the investor in patents. By D. Walter Brown, counsel in patent cases. New York. pp. 64. Price 25 cents.

The Art of Electrolytic Separation of Metals, etc. (Theoretical and practical) By G. Gore, L. L. D., F. R. S., author of the Art of Electro-Metallurgy, The Theory and Practice of Electric-Deposition, Electro-Chemistry, The Arts of Scientific Discovery, The Scientific Basis of National Progress, etc. 301 pages. Illustrated. Published by *The Electrician* Printing & Publishing Company., Ltd., London, 1890. Price $3.50.

The Gold Fields of South Africa; comprising the history, extent, locality and geological formation of the various gold fields; copiously illustrated, containing full particulars relating to gold mining companies, capital, claims, machinery, crushings, reports, dividends, names of directors, secretaries, managers, brokers and directors' directory and copies of the original prospectuses, etc., published in full. 915 pages. Dennis, Edwards & Co., Cape Town, South Africa, 1890.

The Theory and Practice of Surveying. By J. B. Johnson, C. E. Published by John Wiley & Sons, New York, 1891. Pages 730. Illustrated. Price $4.00.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

The Precipitation of Gold from Chloride Solutions.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I hope Mr. Langguth will pardon me in taking exception to the credit he gives Mr. J. E. Rothwell, M. E., for having introduced "Precipitation by Sulphuretted Hydrogen, Produced from Sulphur and Glycerine, in Connection with Gold Chlorination." The introduction of the method was first recommended by the writer in a report to Mr. R. P. Rothwell, on the working of some gold ores from Del Oro. The process was then in use experimentally at the New York Metallurgical Works. To Mr. R. P. Rothwell was due its practical introduction, and the improvement of making the sulphuretted hydrogen as proposed, but under less than atmospheric pressure—a very decided improvement indeed, as the writer has found repeatedly since.

Mr. Langguth's suggestion to, and application of sulphurous acid to neutralize the excess of chlorine, is excellent, and this is honor enough. The Golden Reward Chlorination Works seem, by his description, to be nearly perfect. Perhaps the closing remarks on in article on "Continuous Lixiviation" in the ENGINEERING AND MINING JOURNAL of March 31, 1888, if adopted, would make it perfect. They are as follows: "I would finally apply this same system for leaching out the gold solution from ore chloridized in revolving barrels by Munger' method, as practised in the Phœnix mine, N. C., and the Canada Consolidated, in Ontario." There, also filter-presses, preferably Johnson's, were first suggested to take the place of vats as settling tanks.

E. N. RIOTTE.

NEW YORK, Feb. 13.

Tin in Central Texas.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In an article by Dr. Theo. B. Comstock, in your issue of January 24th, entitled "Tin in Central Texas," I think that two discoveries of tin in that State have been overlooked. In January, 1866, an old Texan took me to a dry gulch about 20 miles south of Gonzales to show me nuggets of silver said to be found there. After panning for half a day we found several lumps of metallic tin, some weighing as much as an ounce. About one mile from this place we discovered an old smelter with an unreduced charge, showing particles of tin. A sample of ore from the top of this carried upward of 200 ounces in silver per ton.

In 1867 a cattleman named McCullough found tin stone in two places on the Nueces River. One sample sent to Swansea for analysis carried 41% of the metal. Ten years later a man named Samples found pieces of ore in a cañon in Llano County, of which samples were assayed at Denver and found to carry over 30% of tin. These fragments had been washed but little, the corners and angles being sharp, and it was decided to make a thorough investigation of the locality. A month's prospecting resulted in the unearthing of three old furnaces in the gulch, all of which had the same characteristics as to the slags as that described by Dr. Comstock. That some pre-historic race worked these tin ores seems a reasonable hypothesis, and that the tin ores must have been obtained in that section is equally certain. If Texas had an equitable mining law the soundness of the deductions of the State Geological Survey would soon be proved or disproved by prospectors.

G. A. F.

SAN FRANCISCO, January 31.

The Atlantic-Pacific Railway Tunnel

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The words of warning concerning this company which have been uttered by your correspondents, are timely as many people who can ill afford to lose money are undoubtedly being led to invest by the glowing terms of its advertisements. As one of your correspondents says, it is poor people that these advertisements are intended to catch. Their cupidity being aroused by its stories of bonanza, they ignorantly snatch at a chance to "make money" (?), buying a lottery ticket where the chances are ten thousand to one against them, where a capitalist, more cautious, would not think of investment without an examination of the company's property.

The Atlantic-Pacific Railway Tunnel is now a hoary-headed scheme; its promoter has been dribbling its stock about the country for the past 10 years, during which time, as he states, he has enrolled more than 4,000 shareholders. It must be explained, however, that not all of the subscriptions were voluntary. The present company had a predecessor, the debts of which were paid with shares in the new concern, and it was thus that hard-headed miners in Colorado were led to invest. Paper was all they received, and never a penny in all these long years have the numerous shareholders, with the possible exception of the "ring" (of course, there is always a ring in such affairs), derived from this *promising* concern.

Possibly the reason has been that the tunnel had not been "driven clear through the granite casing of the mountain into the mineral grounds or veins." However, I must confess that this theory is new to me, although I have had some experience in mining in various places, among others in the same range that this famous tunnel penetrates. The idea that a mountain is like a cocoanut, with a hard shell without and rich meat or silver veins within, is such transparent nonsense that it should find very few people so simple as to believe it.

There is something analogous between this theory and the opinions of a pseudo-statesman of Kansas, who objects to gold and silver as too limited circulating medium, and also that it would be easy for a foreign nation to capture the coin in the Treasury vaults. Geologists, he thinks, "have things down so fine that they can estimate the quantities of gold and silver in the mountains, and the government should issue silver certificates to an amount equivalent to that estimate."

One would infer from "Brick" Pomeroy's statements, which he backs by his personal guarantee (sic), concerning the dividends which his company will pay, that he must have had advantage of the services of one of those clairvoyant geologists in whom the Kansas farmer has such confidence.

Unless he can show smelter's returns for the ore which he professes to be shipping, however, and can prove the reckless and ridiculous statements which he makes concerning the Atlantic-Pacific Tunnel property, which I know he cannot, I advise investors to have nothing to do with this modern Aladdin, who claims to have found such wealth in Mt. Kelso.

NEW YORK, Feb. 16. G. W. K.

Pyritic Smelting.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of January 31st Mr. E. H. Russell communicates some interesting facts and figures obtained in experimentally leaching the San Francisco ores at the Sombrerete mill.

The composition of the ore experimented upon is given as follows: FeS_2, 40%; ZnS, 12%; PbS, 13%; insoluble residue, 34%; total, 99%. In the summary of results at the end of Mr. Russell's article we find that, with an ore averaging 40 ounces silver and $4.50 gold per ton, he extracted 83% of the former and 50% of the latter metal at a cost of $6.48 for milling. Thus the net value of this ore delivered free at the mill, and without deducting cost of marketing product, would be, $28.97, per ton. The character of this ore, as shown by the analysis, leads one to ask, might it not be more economically treated by the process of pyritic smelting? Such an ore containing 66% of sulphurets, which could be heap roasted with only enough wood to light the pile, is a fuel in itself!

In pyritic smelting, FeS_2, ZnS, and the arsenides become metallurgical fuels, replacing coke and charcoal, and an ore such as this would need no preparation by roasting, as in lead smelting, before feeding into the blast furnace. It would be thrown in raw, without fluxes or fuel, provided it is coarse enough to allow the blast to pass through, and adding sufficient matte to the charge to provide iron for building a bisilicate slag and for the necessary matte-fall. Assuming that a matte-fall of one in ten is sufficient for collecting the precious metals in the Sombrerete ores, we would aim to produce 200 pounds FeS for each ton of ore smelted. A ton of Sombrerete ore contains approximately 800 pounds FeS_2, 240 pounds ZnS, 260 pounds PbS, 680 pounds SiO_2; total, 1,980 pounds. 800 pounds FeS_2, less 273 pounds (200 pounds FeS = 273 pounds FeS_2) = 527 pounds FeS_2; 680 pounds SiO_2 call for 816 pounds FeO, equivalent to 1,360 pounds FeS_2, to make a bisilicate slag. It would be necessary then to add 1,360 — 527 = 833 pounds FeS_2 (better 611 pounds matte) to each ton of the Sombrerete ore in making up a charge. This is not the charge that would probably be run in such a case, but the figures are broad enough to cover the situation, and the charge indicator would run through the furnace very fast and hot. There is no danger of incurring losses by charging matte back into the furnace even when of high grade. It appears as though a species of kernel roasting takes place, and unless it is pushed too far the precious metals are amply protected. Instead of charging the matte, as it issues from the furnace, back again, a better way is to partially desilverize it by some convenient means, the Probert process, for instance, and then add the poorer material to the charge.

In pyritic smelting proper, no fuel is used in the blast furnace, but where a sufficient quantity of iron pyrites cannot be obtained, from 2% to 4% coke is sometimes used to make up this deficiency in the calorific power of the charge. Almost any slag that will flow at all can be smelted with 4% coke in this method of smelting.

Owing to the fact that the greater part of the products of combustion are solids, and not gases, there is surprisingly little smoke or flue dust produced, and a correspondingly lighter loss of the precious metals in this direction. The losses are confined almost wholly to the slag, and in this connection it is a curious fact that the addition of lead ores to the charge appears to have no advantage over the use of FeS_2 alone, in collecting values. The losses in the slag are in inverse ratio to the experience of the metallurgist in this field, and to the suitability of the charge operated upon. Fine ore, or pyrites which decrepitate to a powder, produce richer slags than coarse ore and non-decrepitating sulphurets. A very small per cent. of copper in a properly constructed charge gives exceedingly clean slags.

I do not underrate in any way the value of Mr. Russell's process of lixiviation, and I fully appreciate his contributions to metallurgical science. Still, it does seem strange that it has been found necessary to apply a leaching process to a metallurgical fuel. I regret that for business reasons I am not at liberty to publish what has been accomplished in this line of pyritic smelting; but that ores of the above description can be handled to great advantage by this method of smelting will be clear to any one who will figure out what his smelting expenses would be if the costs of roasting, coke and charcoal and fluxes are dropped out. The above facts may be interesting to some of your readers who have ores similar to those of the Sombrerete Mining Company.

PORTLAND, Oregon, Feb. 7. W. L. AUSTIN.

Direct Combination of Iron and Carbon.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: As Mr. Henry M. Howe, in his communication published under the above title in your issue of the 17th ult., appears to censure you for having published certain criticisms that appeared over my signature, I desire to make a few statements concerning the matter of fact involved.

Mr. Howe's strictures can only have reference to expressions contained in the following articles:

1st. "Scientific Ballast and German Professors' Spooks," published in your issue of December 14th, 1889. The reasons for the appearance of this article were broadly stated editorially in the next number, viz., your issue of December 21st, 1889.

2d. Correspondence on "Nickel-Steel Armor Plates," published in your issue of September 27th, 1890.

The term "Scientific Ballast," to which Mr. Howe objects, was first introduced and commented upon editorially in your issue of February 14th, 1885, and the term "Scientific Barnacle" was introduced into technical literature long before that. The distinguished author referred to in my communication has written a work which certainly ranks among the best in technical literature, as well as a number of smaller books on special subjects, so-called popular treatises. I have only criticised one of these treatises, and that one is expressly named, together with the criticism, in your issue of December 14th, 1889. His classical work I have never alluded to, but I have quoted him as an authority in the controversy I had with Mr. Howe on the possibilities of the Darby process, in your issue of July 26th, 1890. I followed up the subsequent developments of the process in my article on Dr. Thielen's paper, in your issue of November 8th, 1890.

Returning to the author, whom I only know by reputation, I have

objected to the manner in which he criticised the nickel-steel experiments of Mr. Riley, who is also unknown to me, and I also opposed his attempts to demonstrate the possibility of molecular migration in solid bodies. He is certainly able to defend himself whenever he sees fit to do so, but I fear he has taken my rather humorous strictures *au grand serieux*. That his position should shield him from such "criticism," I cannot admit. Theoretical chemistry is or ought to be considered an intensely democratic institution. It was perfected at a time when the thermo-chemical laws were still very imperfectly known and when the principles of the indestructibility of energy and of the mechanical equivalent of heat were just becoming understood. Its system of the relations of density to molecular volume of the number of atoms and atomic equivalences is not based on self-evident truths, but it is merely conventional doctrine, and, besides, rather inadequate as far as the present and prospective wants of metallurgy are concerned. This is admitted by very high authorities, but many professors of chemistry and metallurgy teach, nevertheless, as if the whole system—including the apocryphal appendages of atomic motion and molecular migration—were absolutely unchangeable or clear gospel truth.

Moreover, the ENGINEERING AND MINING JOURNAL has shown on several previous occasions that it does not draw the line up to which free discussion is permitted around the chairs of university professors. Hence the little shaking of dry bones and useless doctrines which I have indulged in, should neither be construed as effrontery nor as personal malice. As to the technical part of Mr. Howe's letter, I only mention the introductory sentence, viz. : " Occasionally doubts have been expressed in your paper as to the possibility of making iron and carbon combine directly." I am not aware, however, that any one, excepting myself, ever expressed any such doubt in your columns; but Mr. Howe addressed to me, through you, a studied series of questions on that subject in your issue of July 5th, 1890, which I answered in the next number. From the above sentence I infer that Mr. Howe now evidently desires to avoid further discussion of the subject on my part as far as his contributions are concerned, and I shall govern myself accordingly.

I see no longer any necessity for drawing into the controversy the names of foreigners or the experiments made in foreign countries. The filtering process is now in use in one of the largest works in this country. It is, according to my judgment, the most suitable process for proving that carbon and iron do *not* combine directly. I have put myself into communication with the managers of these works, sending them the article on the subject printed in your issue of November 8th, 1890. If these gentlemen choose to make a thorough investigation, which can be done at a comp ratively trifling expense, the question can be settled at very short notice. It is a very important question, inasmuch as it involves the establishment of the principle of the unity of chemical action in metallurgical smelting operations.

A. D. ELBERS.

HOBOKEN, N. J., Jan. 19, 1891.

The Incubation of More Alaska Bubbles.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My letter in the ENGINEERING AND MINING JOURNAL of December 20th had such an effect in Juneau that an "indignation meeting" was called by *three* citizens and was run by about twice that number, although over a hundred persons attended out of curiosity. Some of the local papers do not hesitate to say that this "indignation meeting" was gotten up by paid agents of the bubbles I had pricked, and that seems quite probable, for the influence of the ENGINEERING AND MI ING JOURNAL among the "lambs" of Boston who were to be shorn again by the same experienced hand, is too great to let its criticism pass without contradiction.

Your correspondent's only interest in this matter is to expose these visionary schemes which are always vastly injurious to a country in the long run. There are numerous small mines in this neighborhood, that might be profitably operated, though only two or three of them are being worked, because such a "gigantic affair" as that of the Nowell's puts such little things in the background and keeps them there ; people who might invest in them hold back to see whether Mr. Nowell's millions will roll out as he promises every season they will. Last summer no less than three of his mines were to pour wealth into the pockets of his eastern stockholders.

The indignation expressed at the meeting was principally due to the fear that harm would result to Alaska mining interests in general by the publication of articles denouncing gross mismanagement or frauds. Your correspondent and every man of honest convictions are of the opinion that a boom worked up on a worthless mine is of lasting injury to a camp, and the benefits derived by the few during the boom are very transitory. After the experience this camp has had in Nowell's "Alaska Union" and the salted "Bear Nest" "bubbles" from which it has by no means recovered, it is strange that any person here can overlook the ill effect of such scheming. One or two of the hot-headed, thoughtless individuals to be found in every public gathering vainly endeavored to persuade the meeting that your correspondent should be hunted down and immediately run out of the country, and some even suggested bringing him in then and there and hanging him. Several of the more sensible persons advised, however, that the matter should be dropped as they were only stirring up a malodorous mess. The meeting was a farce which nearly ended in a row. No proof was brought forward of any inaccuracy in my former letter. Many old-time Basin miners were present, but only two could be prevailed upon to address the meeting, and their talk gave a very good illustration of the manner in which Mr. Nowell has raised the money to continue his mining operations in Alaska—by wind. One of them has run a saloon in the Basin every season which without doubt "panned out well all over the Basin"; the other has been working a placer claim which he and his partner sold for the magnificent sum of $1,200 and at the time thought they were making a fine bargain, as probably they were.

According to the official surveys there are about 54 acres in the Silver Bow Basin, and only a small portion of this ground is covered by the wash from the mineral belt which crosses the mountain slopes to the south of the Basin, and extends east and west. This zone is several hundred feet wide and extends from near the rim of the Basin up the side hill. It is a schist rock, with a large number of small quartz veins, most of them carrying more or less mineral sulphides of iron, lead, zinc, and copper—and some of it quite rich in free gold. A ten-stamp mill and a Dodge mill were worked on this ore last season with very favorable results, of which more later. The placer mining of the Basin since its discovery in 1880 has been confined principally to this mountain side, and most of the ground that it would pay to work has been washed over, the bed rock cleaned, and even the material picked out of the crevices. The richest diggings were found in Quartz Gulch, although some good claims were worked in Ice Gulch. The surface gravel was not very thick, and was filled with boulders, making it expensive and dangerous to work, but it was rich enough in some places to pay well. The mountain is quite steep, and numerous snow slides occur every winter and spring, carrying much débris into the Basin, hence it is probable that considerable gold has been carried into it by these slides as well as by the natural wash and the tailings from the placer mines. However, it is natural to suppose from a practical view of the matter that less gold has been carried down in the wash than has been left behind in the gravel. As near as I can learn, since no statistics have been kept, the amount of gold taken out by placer miners in the Basin district since its discovery is in the aggregate about a million of dollars, although several old-time Basin miners place the amount at only one-half that figure; hence the conclusions arrived at in my previous estimates.

A fact which Mr. Nowell probably did not take into consideration is that much of the ground around the rim and below the mineral zone, which is the source of all the gold, was washed clean to the bed rock before the ground above was washed and the rim rock covered with tailings to a depth of 12 to 20 feet. Another fact which I may call to the attention of Mr. Nowell's stockholders is that when a practical mining man examines a placer claim to determine the value per yard he does not select his panful of gravel from the bottom of the ground sluice under the upper boxes or just above the head box.

Mr. Nowell has his "big tunnel" nearly finished, the water ditch and flume completed, the lumber for sluice box and flume on the ground, and only a little remains to be done before his millions lie within his grasp. If there is so much wealth in his Basin, and its realization is so near, why should he become so indignant at criticism unless it is that it interferes with a stock-jobbing scheme? Why did he not open up the side tunnel last summer and make "handsome returns" to his stockholders last autumn, as he promised? Why did he not run the noted Alaska Union mill on the ore from his "Consolidated" mine, upon which he is now obtaining a patent?

However, members of Mr. Nowell's family have well feathered their nests, withal. Most of his family have lived upon his companies, and his brothers have sold everything that they owned or had an interest in to the companies; at least I do not know of any interests that they have left, and the value or absence of value of what they sold has been pretty well proved.

W.

ALASKA, Jan. 30.

Transactions of Engineering Societies.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of November 15th ,1890, you published my letter criticising the volume of the transactions of the American Institute of Mining Engineers, which had then just been issued, for the absence in it of all discussions of the papers, and criticizing also the general methods of the Institute in reading papers by title; in giving too long time for the actual reading of the papers that are read, shortening thereby the time that might be allowed for discussion; and in not printing the papers in advance of the meeting, so that those members who might wish to discuss them could have time to study them. In that letter I called attention to the much better method that has been followed for several years by the American Society of Mechanical Engineers.

In your issue of November 22d there appeared a letter from "Another Member," and in your issue of December 13th a letter from a "Western Member," both of whom took the same ground that I had taken. No letter has appeared in your columns on the other side of the question. If there is any other side, it is time something were heard from it.

An opportunity is again presented for recurring to the subject by the appearance of Vol. XI of the American Society of Mechanical Engineers, which may well be compared with Vol. XVIII of the Mining Engineers.

In external appearance the volumes are very much alike, the Mining Engineers' volume being a trifle more bulky, although it contains only 993 pages, while the Mechanical Engineers' volume has 1,265. The smaller bulk of the latter is due to the use of thinner paper. The preface to the Mining Engineers' volume states that, in consequence of the large space required in the volume for proceedings and papers, the list of members has been omitted. The other volume includes the list of members, occupying 50 pages.

As stated in my former letter, Vol. XVIII of the transactions of the Mining Engineers contains 70 papers, 44 of which were read by title ; and of the 70 papers only one appears to have been discussed. In the Mechanical Engineers' Transactions there are only 47 papers, but none of them was read by title, and none was actually read in full at the meetings, but presented in abstract, the time allowed for presentation l eing only five minutes for each. All the papers, however, were printed in full in advance of the meetings, and distributed to those members who signified their intention to be present at the meeting or their wish to send in a written discussion. Consequently the transactions include discussions on nearly every important paper, and in many cases these discussions, as revised by the speakers before printing, are more valuable than the papers themselves. Frequently the author of the paper avails himself of the opportunity, which is always afforded, of writing out a rejoinder to the discussions, which is printed frequently, after careful editing by the secretary, with the revised and edited discussion.

As an example of how the papers are discussed the following selections may be of interest·

Dwelshauver-Dery, on "Steam Engine Experiments ;" discussed by Professors Denton, Spangler and Thurston.

Main on "Cost of Steam and Water Power;" elaborate discussion by Webber, and rejoinder by the author.

Randolph, On "Lubricating Car Journals;" discussion by Denton Woodbury, Rogers and Dick, and rejoinder by author.

Thurston, on "Philosophy of the Multi-Cylinder Engine." Criticisms by Denton and Barrus, the latter of whom presented a large number of experimental data, and rejoinder by the author.

Peabody, on "Errors of Calorimeters." Extensive discussion, with data, by Faber du Faur, Spangler, Denton, McBride, Babcock and Barr us, and rejoinder by author.

Holloway, on "How to Use Steam Expansively in Pumps"; discussion by Suplee, Webb, Denton, Thurston, Emery and Hague.

Oberlin Smith, on "Graphical Analysis of Reciprocating Motions." Discussion by Emery, Bond. J. M Smith, Leavitt, Spangler and Suplee.

Denton, on "Influence of the Steam Jackets of the Pawtucket Pumping Engine." Discussion by Emery, Hague, O. Smith, Wolff, Henthorn, Webb, Thurston, Wood and Kafer, and rejoinder by the author.

Gale, on "Theory and Design of Chimneys." Critical discussion by Babcock, Peabody, Webb, and rejoinder by Gale. This paper and the discussion thereon led to three other papers on the subject of chimney draught being presented by Messrs. Wood, Webb and Kent at the next meeting.

Hall, on "Working of Railroads by Electricity," a short paper, with extensive discussion by O Smith, J. M. Smith, Scheffler, Spaulding, MacFarren, Roberts, Woodbury, Barnaby, Barnes, Sweeny, Forsyth, Dashiell, Webber, Morgan and Woods, and rejoinder by the author.

Here are ten papers, revised and edited discussions of which by thirty-five different persons (not counting the same person twice) are printed in the transactions.

The advantages of these discussions are numerous. They give zest to the meetings and insure large attendance; they bring out and cause to be published valuable facts which otherwise might not be published at all; they correct the misstatements or the false theories of the authors of the papers; and if they do not insure the suppression in all cases of bad papers, they at least prevent them from being published to the world without criticism or comment. There was one time when the Institute of Mining Engineers did do as the Mechanical Engineers are in the habit of doing, about ten years ago, when Dr. Dudley's famous paper on steel rails was distributed in advance of the Philadelphia meeting. No one who was present at that meeting will forget how the discussions on that paper, which were written out in advance, tended to keep up the interest of the meeting, and how thoroughly they opened up the question, drawing deductions from Dr. Dudley's own data in opposition to those drawn by himself.

There may be just as important papers as Dr. Dudley's now in the transactions; but where is there one that creates any such interest as that paper did? Out of 70 papers in the transactions, 44 do not see the light of day till some time after the meeting at which they are supposed to have been read. If any of these contain errors, the only chance any member has of bringing them to the attention of the Institute by Institute methods is to write a paper concerning them, which paper in its turn is "read by title" and may appear in print months afterward. The members who would publicly criticise the papers, therefore, are obliged to go outside of the Institute to do it, and use the columns of the ENGINEERING AND MINING JOURNAL, or other technical journals. In this way in a single issue of your paper there recently appeared two independent criticisms of one of Mr. Keep's papers. Why were not these criticisms made inside of the Institute, in discussion of the paper?

My former letter on this subject brought out a few favorable responses. I hope the subject will be taken up by other members, and an agitation begun which will lead to the much-desired reform in the methods of the Institute.

A MEMBER OF THE INSTITUTE.

Reaction for Hydrogen Peroxide.—At a recent meeting of the Chemical Society, says *Industries*, a reaction for hydrogen peroxide of great delicacy was shown. It depends upon the production of an oxide of titanium higher than ordinary titanic acid. When a solution of the latter is added to the liquid containing hydrogen peroxide, a yellow coloration is developed, which is sufficiently marked to admit of its being visible by gaslight, as it was on the occasion referred to. It appears to be characteristic of hydrogen peroxide, none of the ordinary oxidants giving it, thus ranking with the well-known chromic acid test, which it excels in delicacy and persistency. At the same meeting a specimen of a substance rare in the liquid state was exhibited—viz., a fine sample of phosgene $COCl_2$. It was shown in the form of a colorless liquid boiling at 8·2° C.

Soldering Metals to Glass or Porcelain.—At a recent meeting of the *Societe de Physique*, M. Cailletet described a simple method, which he had devised, for connecting glass tubes to metal work in the construction of physical apparatus. The end of the glass tube is first gently warmed, and then covered with a few drops of a solution of neutral platinum chloride and camomile oil. On gently warming the tube to a dull redness the platinum salt is reduced to the metallic state, and a brilliant deposit of the metal is formed on the end of the tube. The tube is then connected to the negative electrode of a battery and immersed in a bath of copper sulphate, when the copper is deposited as a malleable adherent coating on the platinum flux, and thus forms a material which can be brazed on to brass or copper in the ordinary way. Solderings effected in this manner are said to be very strong. The top of a tube attached to M. Cailletet's apparatus for liquifying gases terminates in a soldered end, and successfully resists pressures of over 300 atmospheres.

Coral Growths on Submarine Cables.—Very little is as yet known as to the rate of growth of corals, but some very interesting details have been published by Prof. Alexander Agassiz in the *Bulletin* of the Museum of Comparative Zoology at Harvard University, with regard to a series of specimens which were taken in June, 1888, off the Havana and Key West cable, from a portion repaired in the summer of 1881. Consequently the growths could not have been more than those of about seven years. It must be noted that this portion of the cable was laid at a depth of only from six to seven fathoms, and that the district in which it was laid was most favorably situated as regards food supply to the corals. Some of the specimens belonged to species whose rates of growth had never before been recorded. Verrill mentions that the thickness of the *Orbicella annularis* coral formed in 64 years was not more than about 8 inches; the specimens from the Havana cable grew to a thickness of 2½ inches in about seven years. *Manicina areolata* has grown to a thickness of 1 inch; while *Isophylla dipsacea* shows a still more rapid growth, projecting 2½ inches above the cable. Of course it is quite possible that these corals are of less than seven years' growth, but it is not probable that more than a short time passed before some of the swarms of pelagic coral embryos which must have floated past the cable found a place of attachment thereon.

AMALGAMATION ON THE COMSTOCK LODE, NEVADA.—II.*

By A. D. Hodges, Cal.

(*Concluded from page* 206.)

The slimes from Comstock mills often assayed as high as the original ore, but for years were allowed to run to waste, as no one knew how to work them with profit, although the pan tailings, holding considerable amalgam, were treated more or less successfully from about the year 1864. The usual treatment consisted of concentration on blanket sluices—shallow troughs with sides an inch or two high, covered with coarse blankets, set at an inclination of 6 to 12 inches in 12 feet, the concentrates being amalgamated in a manner similar to that used for ore: their richness resting largely in the amalgam that they contained, the treatment was a comparatively easy matter, and the cost being light, many operators prospered in this work, until the gradual decrease in value of the tailings and conflicts with the Virginia and Gold Hill Water Company drove many out of the business.

After the use of blanket sluices had been well established, reservoirs for impounding sluices and tailings were built here and there, although not upon an extensive scale until the process for working them had been brought to a point where success seemed certain. The development of this process was mainly due to Louis Janin, who in 1862–63 was metallurgist of the Mexican mill, the tailings from which were dried, roasted in reverberatory furnaces and amalgamated in barrels. Raw amalgamation was also tried, with partial success. In 1864, Janin, having been called to the old Gould and Curry mill, put up experimental pans, and worked tailings in various ways, generally trying to imitate the patio process, these tests being attended with a fair measure of success, and indicating strongly the utility of bluestone and salt. In 1866 the Gould & Curry Company built the Reservoir mill for the treatment of its tailings, this being the first mill erected expressly for that purpose.

Janin seems to have been confident of success as early as 1866, and in that year constructed a reservoir in Six-mile Cañon. In September, 1867, he commenced to work the material thus collected in the Cañon

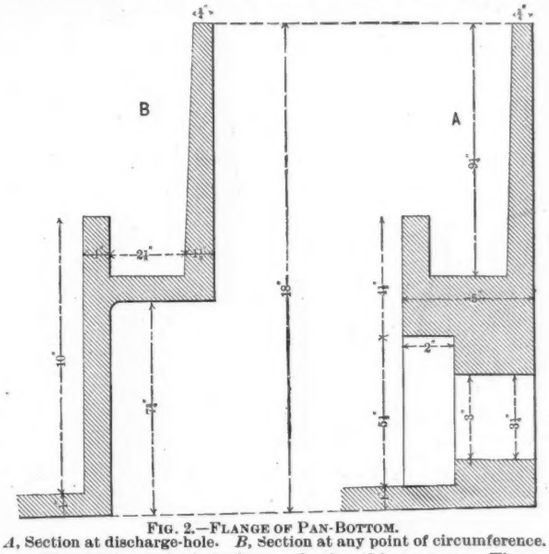


FIG. 2.—FLANGE OF PAN-BOTTOM.
A, Section at discharge-hole. *B*, Section at any point of circumference.

Tailing mill, which he had built nearby for this purpose. The possession of a mill of his own enabled him to push his researches with more independence than before. He tried various chemicals, but always obtained best results with sulphate of copper and salt, although a poorer amalgam was produced by the use of these chemicals.

In 1868 Henry Janin became financially interested with Louis, and the two brothers, aided later by Alexis Janin, made a systematic, extensive and costly series of experiments, which thoroughly demonstrated the efficacy of bluestone and salt. The proper proportions of these chemicals having been determined, and the fact that base bullion was a necessity, having been accepted, the success of the process became practically complete.

It was impossible for them to keep their discovery a secret, however, and a large number of mills for the treatment of tailings were speedily erected. The result of this increase in numbers was that soon rich tailings were no longer to be bought; even low-grade material was difficult to get at paying prices, and the Janins were finally forced out of the business. In 1874 the price of quicksilver had risen from 60 cents to (at least) $1.30 per pound, and the price of silver had fallen, adding essentially to the troubles of the tailings mills, which were by this time struggling with low-grade material, so that all the mills in Washoe, except the Lyon mill, were obliged to close down, some temporarily and some permanently, and none, with the exception noted, made any long runs thereafter.

The best arranged, best equipped, and most successfully conducted tailings mill ever operated was the Lyon mill at Dayton, which had been built in 1865 by Birdsall & Carpenter to crush ore, and had run for several years, intermittently and without much profit. When the treatment of tailings began to attract attention, George Langtry, a most energetic and able millwright, induced its owners to undertake this branch of the business, and when the Janins had perfected their process he found out its details and applied it with success. George Langtry was, all things considered, the best tailings man of Washoe. Realizing his own deficiency in chemical knowledge, he remedied this want by always having a capable metallurgist associated with the establishment. Under

*Abstract of a paper read before the American Institute of Mining Engineers, New York, September, 1890.

his management the Lyon mill achieved a success unparalleled in the history of tailings mills. From 1869 to 1878, notwithstanding the decline in value of material worked, and the increase in price of quicksilver, the mill steadily paid large dividends. The mechanical skill and executive ability of Langtry supplemented by the chemical knowledge of his assistants were sufficient to overcome each new difficulty in amalgamation as it arose. Thus in 1874, when the discount on base bullion had risen to 27%, a process for refining it was devised, whereby not only were fine silver and fine doré bars turned out, but the copper, previously lost, saved; and no one else ever succeeding in refining bullion so rich in copper, other mills sent their product to the Dayton refinery, which derived a considerable revenue from such work. This process solved the difficulty which had so long delayed the success of the Janin brothers and rendered their method complete. Langtry died in 1875, but so long as his policy prevailed the mill was operated with much profit, although the tailings treated decreased in value to about $5 per ton.

In 1877 the bonanza firm built the Omega mill, of 170 tons daily capacity, which ran for a number of years on slime from the Consolidated California and Virginia ores. It was the last successful mill of the kind erected at the Comstock.

The plant of the Lyon mill was slowly wrought out by experience. Its perfected arrangement was as follows: The mill-building was located on a steep side hill with abundance of fall. The tailings were hauled from the dumps and reservoirs in cars which entered on the upper floor directly over the bins. The spouts from these discharged directly into the pans. There were eight pans for treating the tailings, locally called "sand," and two pans for the slime. The pans were supported on an open framework, admitting light and giving free access to the shafting and gearing below. There was a settler to each pan. The sand settlers were nine feet in diameter by seven feet high. The slime settlers were eight feet in diameter. They discharged over blanket sluices which extended from the mill to the Carson River. All the machinery of the mill was run by a Leffel turbine, placed with its axis horizontal, under a 52-foot head.

The construction of the pans is shown in the accompanying sketches (see also p. 205), the dimensions given being those of the larger pans. The height of the flanges of the pan-bottom was gradually increased until it reached these figures. This prevented all the leakage of quicksilver

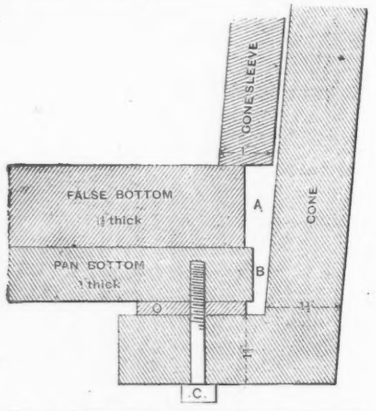


FIG. 3.—MODE OF FASTENING CONE TO BOTTOM.
A, space between false bottom and cone, caulked with pine. *B*, space between bottom and cone, caulked with thick red-lead and hard-wood wedges. *C*, eight ⅝-inch bolts. *O*, rubber gasket, with thick red-lead and oil.

between the staves and the iron—a leakage which occurred, to a greater or less extent, with low flanges, despite all methods of corking which could be devised.

Iron rings were used to protect the flanges. The greatest wear on the pan was at the discharge hole, where, in the older construction, the iron was rapidly destroyed until the hole became enlarged to such an extent that it could no longer be plugged securely; and thus the whole bottom was, of necessity, thrown away, although sound in all other respects. By casting the bottom with an outside boss at this place, having a square socket on the inside, 7½ inches wide by 5½ inches high by 2 inches deep, this socket being filled with an oaken plug bored for the discharge hole, and by using false bottoms, the life of the pan was prolonged for years. An oak plug lasted as long as three false bottoms and rings. A false bottom 1½ inches thick wore out a 2-inch ring and a muller.

The wooden staves forming the pan-sides were protected by a lining of inch stuff, 2 feet long, nailed on the inside. Instead of wings, five pieces of timber, 3 inches by 4 inches, by 2½ feet long, spiked vertically to the sides, were used with satisfactory results.

The muller and shoes were cast in one piece, as shown in Fig. 4. By leaving ample spaces, both on the outside and the inside of the muller, with a proper speed, there was no difficulty in securing a good circulation of the pulp.

The tailings worked at the mill from 1873 to 1877 inclusive were classified under the local designations of "sulphurets," "slimes" and "sand."

The sulphurets, principally of iron, purchased from the blanket sluices so extensively used, were obtained only in small amounts, and made no figure in the production of the mill. They were usually amalgamated by themselves, and yielded from 50% to 80% of their value, according to the degree to which they had been oxidized by exposure to the air.

The slimes were all purchased from the stamp mills. The silver contained in them existed apparently in part as a simple sulphuret (such as argentite), and in much larger measure as a multiple sulphuret (such as stephanite or polybasite). Their chemical composition varied materially. Their chief constituent, clay, was the main cause of the difficulty in treating them. The slimes were spread out on the ground, all lumps being broken up, and allowed to dry thoroughly before being worked. Long experience proved beyond question that this preparatory drying was essential for good amalgamation.

At Dayton, two pans were reserved for treating this material, which was mixed in the pan with certain amounts of sand. The usual charge was composed of 60% to 65% of slime and 40% to 35% of sand. The sand seemed to act beneficially by cutting up any lumps of slime which might exist, and by clearing the globules of quicksilver from any adhering slimy envelope which, unless removed, would keep the quicksilver from contact with the precious metals, prevent the globules from uniting, and carry them off in the stream of tailings. The slimes varied in value from $13 to $30 per ton. The slime charges (slime and sand mixed) during the years 1875 to 1877 assayed from $13 to $18 per ton.

The sand was that part of the tailings which had escaped from the stamp-mills, and after passing through numberless blanket sluices and other concentrators, finally had been caught in reservoirs. By far th larger part came from the company's large reservoir on the flat at the mouth of Gold Cañon. The material deposited at the upper end of each reservoir, near the inlet, was left untouched, being too coarse and poor. The remainder, which held a little slime and assayed from $5 to $7 per ton, averaging only a shade over $5 during the years 1875 to 1877, was scraped up and hauled into the mill.

The sand formed 90% to 95% of the whole amount amalgamated in this period. It consisted principally of fine quartz sand, whence its local name, and held limited but varying amounts of clay. Iron and copper pyrites were distinguishable, but beyond this the mineral composition was doubtful.

At the Lyon mill, tests were continually made to determine what modifications were required by the varying character of the tailings, and no trouble was spared to make these tests accurate. No experiment was considered satisfactory unless sufficient material had been treated to give results in bullion. Hence, a week's run at least was made in each instance, and often a month was taken to complete a test.

Four samples were taken daily from the mill—one, of the sand worked in the large pans; another, from the large settlers; a third, of the slime charges of the small pans; and a fourth, from the small settlers. In getting the settler samples, a dipperful was taken from near the surface of the charge just before each plug was pulled, and poured into large buckets. This method seemed preferable to the more usual way of taking the sample from the material as it ran out of the plug holes. The percentage of yield, calculated from the settler assays, did not usually differ from that obtained by the bullion product by more than one-hundredth of the assay value of the material milled.

The pans all ran four hours. With the low-grade material, treated any increased product arising from longer amalgamation was more than counterbalanced by the increased expense. While the pans were being charged live steam was introduced until the pulp was heated to a degree just bearable to the hand. No advantage was derived from greater heat; on the contrary, a higher temperature was apt to volatilize the mercury, which occasionally was found condensed in the caps of the driver.

The salt was introduced with the tailings and the bluestone added about half an hour later. After the pans had run nearly an hour and the pulp had been brought into proper condition, the quicksilver was charged.

The amount of sulphate of copper used, while varying with the different materials treated, averaged about 10 pounds per ton for the sand pans and 20 pounds per ton for the slime pans. When the loss of quicksilver commenced to increase, either more bluestone or more acid was charged, according as outside conditions made it more convenient, and always with improved results. The useful effect in such cases was probably due to the excess of acid, which might act chemically or mechanically on the clay in the mass It is possible that the acid may have combined with the clay to form alum, which, according to Malaguti and Durocher, acts beneficially in amalgamation.

From 2 to 2½ pounds of salt was used to each pound of bluestone. Careful experiments determined decisively that no better results were obtained with greater proportions of salt, and that it was not safe to use less.

The quicksilver charge was 50 pounds per ton for all tailings (sand or slime) usually coming to the mill. For uncommonly rich slimes the amount was increased.

Much stress was laid on having the pulp in the pan of proper consistency. Repeated tests had shown that better results were obtained with thick than with thin pulp. The pulp was considered thick when it would drop slowly (not run) from a stick which had been dipped into the charge. With the right consistency, the mass had a slow, rolling motion, and the quicksilver could be seen in small globules thoroughly disseminated through it.

In 1877, a long series of exact experiments was made to determine this question afresh. The results were as follows:

Pulp.	Tons worked.	Tons per charge.	Assay per ton. Ag.	Au.	Total.	Yield in Bullion. Ag%.	Au%.	Total%.
SAND PANS.								
Thin	6972.9	2.78	$4.40	$1.09	$5.49	61.6	23.0	53.9
Thick	12231.4	3.22	3.67	1.13	4.80	75.8	25.0	63.8
SLIME PANS.								
Thin	554.3	1.08	20.15	3.51	23.66	74.4	39.8	69.3
Thick	1625.4	1 45	13.26	2.27	15.53	85.8	42.5	79.5

An additional argument in favor of thick pulp is, that in a given time larger amounts of material can be treated, and, therefore, an increased production obtained without materially increasing the working expenses.

One possible cause of the greater yield of thick over thin charges is the less violent agitation of the quicksilver, which is easily floured by excessive churning. Such churning does not occur with a proper consistency and movement of the pulp, but the quicksilver is subjected to a slow rubbing, which tends to keep it clean and perhaps remedies fouling.

The Lyon mill had a settler for each pan, an arrangement more conducive to better extraction of the precious metals, and especially to the saving of quicksilver, than the usual plan of only one settler to a pair of pans. When a charge is first run off into the settler, quite a large amount of the quicksilver appears to be floured, but this quantity constantly decreases as time passes. Moreover, in this apparatus the process of amalgamation is carried on to a considerable extent, and of course the longer the time the more opportunity is given to the quicksilver to settle. The settlers should be watched as carefully as the pans. With intelligent care and proper construction they can be run off clean, and agitators can be dis

pensed with in treating tailings. A larger diameter than 8 ft. is not desirable. If greater capacity is needed, it should be obtained by increasing the height.

The quicksilver must be kept clean. With proper precautions against grease and similar substances, moderate doses of sodium or cyanide of potassium, put in the quicksilver in the tanks, with careful and repeated sponging of the surface of the bath, generally prove sufficient for this purpose. The main requisite is cleanliness, which includes careful handling. At Dayton the loss of quicksilver (from all causes)s averaged only one-half pound per ton, being somewhat less than th figure for the sand, and from 0·75 to 1 pound for the slime charges.

The fineness of the bullion did not average much over 150. It may be said, with some limitations, that the best results were obtained from sand

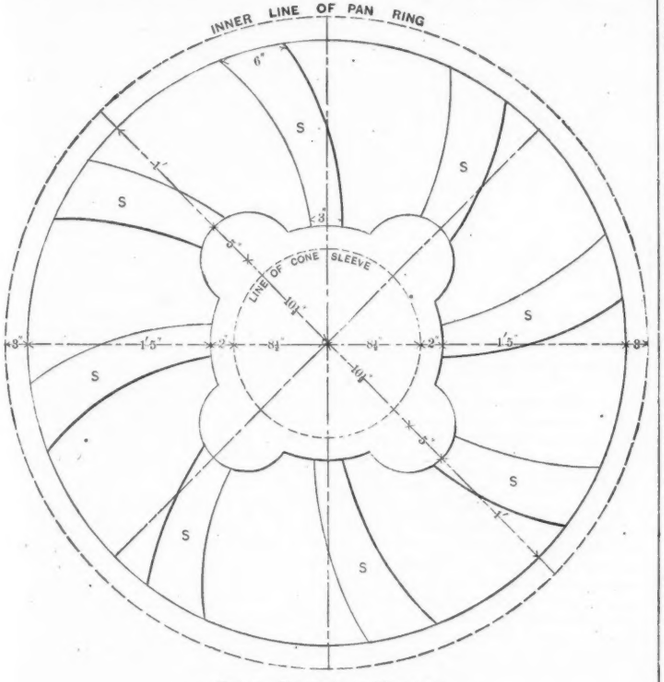


FIG. 4.—BOTTOM OF MULLER.
S, S, shoes cast in one piece with muller.

when the bullion was about 150 fine, and from the (richer) slime charges when it was from 200 to 250.

The following table gives the cost per ton of working 46,500 tons of tailings in 1876:

Preparing and hauling.		Sundry supplies	0.121
Labor on reservoirs	$0 206	*General.*	
Hauling, teams	0.102	Assaying	0.021
Sundries	0.005	Office expenses	0.013
Milling.		Legal expenses, taxes and insurance	0.065
Labor	0.385	Bullion export charges	0.016
Quicksilver	0.282	Sundries	0.033
Salt	0.288	Superintendence	0.069
Bluestone	0.493		
Iron	0.205	Total, per ton	2,475
Fuel	0.173		

In this table the cost of labor per ton on reservoirs was divided as follows: Chinamen, 0·113 shifts, at $1.51; whites, 0·012 shifts, at $3 003. In milling the labor was 0·113 shifts at $3.42. Supplies were: 0·45 pounds quicksilver at 62½ cents; 23·7 pounds salt at 1·245 cents; 12·3 pounds bluestone at 4 cents; 3·1 pounds iron at 6¼ cents, and 0·276 cords fuel at $6.26.

Nickel-Steel Tests.—Some nickel-steel plates recently tested at the Carnegie Works, the specimens being cut from a three-fourths inch plate, gave excellent results. The elastic limit is said to have been 59,000 to 60,000 pounds, and the ultimate strength 100,000 and 102,000 pounds. The reduction of area was 29½% and 26½% respectively.

Earthquake Phenomena.—In the Ninth Annual Report of the Geological Survey of the United States, Captain Dutton presents an able and exhaustive discussion of the famous Charleston earthquake of August 31st, 1886, the results of which are of much value. The earthquake is remarkable as one of great severity, taking place independently of any region of volcanic activity. The conditions existing for obtaining a full record, over the country involved, of the time, duration and effects of the earthquake were on the whole unusually favorable, and some 4,000 reports from 1,600 localities were collected by the Geological Survey. The chief scientific result from the study of the earthquake is the conclusion as to the speed of propagation of the earthquake wave, the result being 3·226 ± 0·147 miles, or 5,192 ± 236 meters per second. This velocity is not only entitled to much greater weight than results obtained in connection with similar phenomena elsewhere, but, further, it agrees closely with the calculated rate of propagation of a wave in an elastic, nearly homogeneous, solid medium of materials corresponding to those here involved. There were found to be two epicentral regions, near Charleston, one 15 miles northwest near Woodstock, about which the isoseismals are nearly circular, the other to the south of this and 12 miles west of Charleston, on Rantowles Creek, with oval, isoseismals, the major axis extending toward Woodstock. At the former center the deduced depth of the focus is 12 miles, with a probable error of two miles; at the other the material for conclusion was less satisfactory, but the depth is made about eight miles.

THE CALCULATION OF THE BLAST IN IRON FURNACES.

By A. Ledebur,* translated for the Engineering and Mining Journal by H. B. C. Nitze, E. M.

In order to obtain a thorough idea of all the conditions influencing the working of the blast furnace, it will often become necessary for the furnaceman to determine the amount of blast furnished to the furnace in a given time (per minute). The solution of this problem may be accomplished in several ways. The simplest method, which it is true will furnish but approximate values within rather wide margins, depends upon the consumption of the carbon in the furnace within a given time.

All carbon coming in contact with the blast at the tuyeres of the furnace is burned to carbon monoxide by combining with the oxygen of the air. As the ratio of the oxygen in the blast to the total amount of air in the same is known, we are easily enabled to calculate the amount of air led into the furnace, if all of the carbon charged into the throat of the furnace settles to the tuyeres.

Let A = amount of fuel consumed in 24 hours; p = amount of carbon in one kilogram of fuel used; Q = quantity of blast per minute; then $Q = \frac{Ap}{320}$ cubic meters.

However, a part of the carbon is consumed directly in the reduction of the ores without ever reaching the tuyeres; another part is absorbed by the iron and discharged from the iron together with it. The actual quantity of air consumed is, therefore, really less, and it will be necessary to multiply the above value of Q by a coefficient in order to obtain an approximately correct result. For most furnaces this coefficient will vary from 0·75 to 0·85, and will, of course, be proportionately less for more refractory ores.

Another equally simple, though, as in the former case, only approximate method, is dependent upon the area and velocity per minute of the piston of the blowing engine. Theoretically, the amount of air will be equal to the product of the area by the velocity of the piston; but on account of the lost space in the cylinder and the imperfect action of the valves, the blowing cylinders will not take up their full contents of air, and a part of the same is also lost in its passage to the furnace. According to Hauer,† the effective capacity of the blowing engine and blast pipes will not exceed 0·7; if, therefore, Q = quantity of air led into the blast furnace per minute, A = area of the piston in square meters, V = velocity of the piston per minute in meters, then $Q = 0{\cdot}7\ A\ V$. In defective blowing engines or blast pipes the value of Q may, of course, be materially decreased.

If the velocity of the blast issuing from the nozzle and the cross section of the nozzle be known, then the product of the same multiplied by a constant coefficient of efflux, established by practice, will give the quantity of air discharged, corresponding to the temperature and tension reigning in the nozzle, and by making a proper correction the corresponding quantity of air at 0 degree temperature and 760 millimeters pressure may be readily calculated.

The velocity of the blast issuing from the nozzle is ascertained from the pressure measured by the manometer.

Let Q = amount of air in cubic meters per minute furnished by each nozzle, reduced to 0 degree temperature and 760 millimeters pressure; h_1 = pressure given by manometer reading, expressed in meters in the height of the mercury column; h_2 = pressure existing in the furnace in front of the tuyeres, expressed in terms similar to h_1; d = diameter of the nozzle in meters; f = coefficient of correction, dependent upon the temperature of the blast (t_1) and the height of the barometer (b); λ = a coefficient of correction which becomes necessary for the reason that the temperature of the blast is affected by the higher pressures of the same. (With low pressures λ may be taken equal to 1.). Then we shall have: $Q = 18{,}740\ f\ \lambda\ d^2\ \sqrt{h_1 - h_2}$ cubic meters; f will have the following values:

$b + h_2$ in meters of mercury col.	Temperature of blast. 260° C.	300° C.	350° C.	400° C.	450° C.	500° C.	550° C.
0·80	0·73	0·70	0·67	0·65	0·63	0·60	0·58
0·85	0·75	0·73	0·70	0·67	0 65	0 62	0·60
0·90	0·77	0·75	0·72	0·69	0·65	0·64	0·62
0·95	0·80	0·77	0·74	0·71	0·68	0·66	0 63
1·00	0·82	0·79	0·76	0·73	0·70	0·68	0·65
1·05	0·84	0·80	0·77	0·74	0 ;2	0 69	0·66
1·10	0·86	0·82	0·79	0·76	0·74	0·71	0·68
1·20	0·89	0·86	0·83	0·80	0·77	0·74	0·71
1·30	0·93	0 90	0·86	0·83	0·80	0·77	0·74

The values for λ will be:

$b + h_2$ in meters of mercury col.	$h_1 - h_2$ in meters of mercury column. 0·1	0·5	1·0	1·5	2·0
0·8	1·00	0·98	0·96	0·94	0·92
1·0	1·00	0·98	0·97	0·95	0·94
1·3	1·00	0·99	0·98	0·96	0·95

More complete tables may be found in Die Hüttenwesens Maschinen, by J. v. Hauer, 2d edition, p. 509.

The calculation of the blast by the aid of the given formulæ and tables would undoubtedly give pretty close results, if it were possible to ascertain the correct average values of h_1 and h_2; *i. e.*, the pressure of the blast in the nozzle, and the pressure of the gases in the furnace. The reasons why h_1 can only be determined with approximate accuracy are well known, viz.: On account of (1) the variation of the blast pressure in general; (2) the variable pressure at different parts of the blast pipes, due to friction, variation in cross-section, bends in the pipes, etc.; and, (3) currents and eddies arising from the insertion of the manometer tube in the blast

But it is even more difficult to find a correct value for h_2; certainly very doubtful results are obtained from measurements made by inserting a tube in the furnace, on the outer end of which the manometer is fastened, as the pressure of the gases in one and the same cross-section of the hearth will show far greater variation than is the case in the blast pipes. Rittinger has proposed a method, namely, to allow the blast to escape from the same tuyere through which it had previously entered the furnace, measure the pressure, and calculate the amount of air blown out (h_2 will then equal 0). This method, were it to be carried out correctly, would meet with no inconsiderable practical difficulties, at least in the working of the blast furnace.‡

*Handbuch der Eisenhüttenkunde, p. 444 et seq.

† Hüttenwesens Maschinen, p. 63.

‡Compare C. Schinz, Studien über den Hochofen zur Darstellung von Roheisen. Augsburg, 1871, p. 83.

A last method for calculating the quantity of the blast, though only adaptable in exceptional cases, depends upon the fact that the nitrogen of the air entering the furnace is found unchanged in the escaping gases, without being materially increased or decreased. If, therefore, the composition of the gases and the amount of the same within a definite interval of time be known, the quantity of air blown in may be calculated without difficulty, in as much as atmospheric air contains 79 parts nitrogen and 21 parts oxygen, and consequently there are 100 parts nitrogen to every 126·5 parts of atmospheric air. The composition of the gases is ascertained by chemical analysis; the quantity of the same is ascertained from the quantity of carbon entering the blast furnace in definite intervals of time, partly from the fuel and partly from the carbonic acid in the ores and fluxes, from which must be deducted the small amounts taken up by the pig iron. With this exception all of the carbon reappears in the gases.

Let k_1 = amount C furnished by the fuel in kilograms per minute; k_2 = amount C furnished by the limestone and carbonate ores in kilograms per minute; k_3 = amount C absorbed by the pig iron in kilograms per minute: then $k_1 + k_2 - k_3$ kilograms of carbon escape with the gases per minute. This carbon in the gases exists, usually, in three combinations: (1) carbonic acid, (2) carbon monoxide, (3) as hydrocarbons.

Carbonic acid contains 0·2727 parts of its own weight of carbon; carbon monoxide contains ·4286 parts, and light carbureted hydrogen 0·75 parts.

From the composition of the gases, the amount of carbon which is carried off at the throat of the furnace by each of the above mentioned constituents of the gas, is therefore readily ascertained; and, as the total amount of carbon escaping per minute is known from the formula $k_1 + k_2 - k_3$, the quantity of gas issuing from the furnace per minute can be ascertained. From the percentage of nitrogen in the gases, the total amount of nitrogen issuing per minute is known, and from that the amount of air blown into the furnace.

An example taken from practice given by Stöckmann† may serve as an explanation. In one of the blast furnaces at the Phœnix Iron Works, at Laar, in Ruhrort, the composition of the gas was:

	By volume.		By weight.		By volume.		By weight.
N	55·76%	or	54·79%	H	0·97%	to	0·07%
CO_2	9·99%	"	15·42%	H_2O	8·00%	"	5·05%
CO	24·88%	"	24·45%				
CH_4	0·40%	"	0·22%		100·00%	"	100·00%

Consequently, the gases contain carbon

in CO_2	15·42 × ·2727 =	4·21 parts by weight.
" CO	24·45 × ·42·6 =	10·48 " "
" CH_4	0·22 × ·75 =	0·17 " "
Total		14·86 " "

And one kilogram of the carbon contained in the gases is distributed as follows among the separate constituents of the gas: CO_2, 0·283 kilograms; CO, 0·705 kilograms; CH_4, 0·012 kilograms: total, 1·000 kilograms.

With a daily production of pig iron of 40,000 kilograms, and a consumption of coke, containing 77% carbon, of 1,300 kilograms, the amount of carbon entering the furnace in the fuel in 24 hours is 40,040 kilograms. The ores are free from carbonic acid. The percentage of CC_2 in the limestone is 43, or 11·73% carbon; the daily consumption of limestone is 48,000 kilograms. Accordingly the amount of carbon entering the furnace in the limestone is 5,630 kilograms. The pig iron produced contains 4% carbon; consequently the total amount of carbon taken up by the iron in 24 hours is $40,000 \times 0·04 = 1,600$ kilograms. Therefore the amount of carbon leaving the furnace in 24 hours in the gases is $40,040 + 5,630 - 1,600 = 44,070$ kilograms. From the above given distribution of the carbon into its different gases, we can calculate the total amount of carbon entering each of these gases in 24 hours; it will only be necessary to consider one of the gases, and then to calculate the volume of the same from its percentage contained in the gas mixture. For instance, from the above figures, for every kilogram of carbon there are 0·705 parts CO; therefore in 24 hours $44,070 \times 0·705 = 31,069$ kilograms of carbon enter into this gas. These 31,069 kilograms of carbon are contained in 72,494 kilograms CO, which occupy a volume of 58,000 cubic meters, as one cubic meter CO weighs 1·25456 kilograms. According to analysis, the furnace gases contain 24·88% by volume of CO; therefore the total amount of gas issuing from the furnace in 24 hours is 233,120 cubic meters, or 162 cubic meters per minute. The 162 cubic meters gas contain 55·76%, or 90 cubic meters of nitrogen, which pass through the furnace unchanged. But 90 cubic meters of nitrogen require 114 cubic meters of air, which must be furnished per minute by the blast. The percentage of CO_2 in atmospheric air may be disregarded in the calculation, on account of its insignificant quantity, without affecting the accuracy of the result materially.

† C. Stöckmann, Die Gase des Hochofens und der Siemens- Generatoren, Ruhrort, 1876, p. 35.

HOWE'S METALLURGY OF STEEL.

London *Industries* in its issue of Jan. 30 says concerning this work that, although professing to be the outcome of a desire on the part of its publishers, the Scientific Publishing Company, to give metallurgists an account of American steel works, it fulfills a much larger design. The author practically gives an exhaustive account of all that has been done since the appearance of Percy's well-known manual, as he passes on to the various sections in the important departments of steel manufacture, and the application of this material to industrial purposes. The term *steel* is used in its modern acceptation, and is made to include mild steel or ingot iron, as well as those alloys of the metal that are capable of being hardened and tempered. The intelligent observer of those mysterious actions to which cutting tools made of steel owe their main value will be pleased to find a well-founded theory that explains them, even though we are told that it must be accepted as provisional.

The subject matter of the book is treated on a methodical plan that must greatly facilitate the labor of reference, more especially to those who may consult the work on any of the many difficult questions bearing on the effect of the presence of various elements in the composition of steel. The chapters in the section that treats on these matters begin in each case with a summary containing the leading facts and conclusions, which are expanded in succeeding paragraphs, and the evidence for or against which is given in detail. In this way the effect of the various metals and metalloids that are usually met with in combination with steel is dealt with, not only from the point of view of the chemist, but also in their most intimate practical relations, so that the manufacturer has here a perfect storehouse of information.

The steel maker will turn with interest to the chapter on the prevention of "blow holes"-and "pipes," a subject intimately connected with the phenomena of the absorption and escape of gases from iron treated of in the antecedent chapter. Chemists on the lookout for useful work to do will find other helpful suggestions in this book, such as the hint that the sulphuric acid, now wholly lost, in the calcination of the ferrous sulphate obtained as a by-product from the pickling liquor used in wire mills, might be recovered. The very interesting section on wire drawing may follow naturally after a discussion on "the rationale of the effects of cold working." So detailed an account, however, certainly comes as a surprise, even though the important and manifold uses to which wire is applied quite justify the introduction of a thoroughly practical description of the process that is sure to be appreciated by many readers. The author throughout fearlessly gives expression to his opinions when they differ from the fashionable beliefs, thus greatly adding to the value of the work, which is illustrated with upwards of 200 engravings and diagrams and a like number of original tables.

MOORE'S VOLUMETRIC ESTIMATION OF MANGANESE.

Thomas Moore, in the *Chemical News*, February 6th, describes a new process for the determination of manganese, which he states to be both rapid and accurate. The process depends on the conversion of manganese into the fine violet-colored manganic metaphosphate, MnP_2O_9, and the titration of this compound by some reducing agent, such as ferrous sulphate, until the violet color completely disappears, thus indicating the complete reduction to manganous metaphosphate and end of the reaction.

For the oxidation of the manganese to the manganic state, potassium chlorate has been found the most effective and convenient; nitric acid also gives a complete oxidation, but the formation of nitrites at a later stage of the process exercises a reducing effect, and gives results considerably below the truth.

The substance to be examined is dissolved in a suitable solvent, and the solution concentrated until only 2 or 3 c. c. remain; from 10 to 20 c. c. syrupy phosphoric acid are then added, or the substance may (as is not unfrequently the case) be dissolved directly in the phosphoric acid. The acid most suitable for the above purpose is that known as syrupy phosphoric acid, having a specific gravity of about 1·75. A few crystals of potassium chlorate are now added to the mixture, and the whole gently warmed until the action, at first rather energetic, becomes quieter; the heat may now be increased and the solution left to itself until all odor of chlorine has vanished. The addition of the potassium chlorate causes the liquid to become of a dirty pink color; this, however, on the continued application of heat, gradually changes to a magnificent deep violet, strongly resembling that of a solution of potassium permanganate. The thick syrupy liquid after cooling is dissolved in about 100 c. c. water, and titrated direct by means of a solution of ferrous sulphate, continuing the addition of the latter until the violet color is dissipated, or add at once a known quantity of the iron solution, and titrate back the excess by means of potassium permanganate in the usual manner. Having found by either method the amount of iron oxidized, a simple calculation will give the quantity of manganese present. Thus, considering the metals present only as oxides, we have $Mn_2O_3 + 2FeO = 2MnO + Fe_2O_3$. Hence, 1 part of Fe represents 1·4108 parts Mn_2O_3.

Everything considered, the best reducing agent is probably the ferrous sulphate, as it may be prepared when required from metallic iron, besides giving a sharper and more decided reaction than oxalic acid, etc.

In testing this method with such compounds as the sulphate, the carbonate, or the pyrophosphate of manganese, the results obtained were excellent, and in the analysis of some minerals, slags, etc., the figures found agreed so well with those by the gravimetric method that it would be difficult to decide in which process the error lay.

The only metal which interferes is chromium; this, being oxidized by the potassium chlorate, passes into solution, and, oxidizing the iron, gives a false number. Cobalt, which under the circumstances might be supposed to pass into a higher state of oxidation, does not interfere, provided care is taken that all free chlorine is expelled before proceeding to titrate; nevertheless, appearances seem to indicate the formation of a somewhat similar compound at lower temperatures, the liquid assuming a deep brown color. Inasmuch as the rose color of the cobalt marks the end of the decomposition, it is best first to add an excess of the iron solution, and then, after neutralizing the cobalt coloration by the addition of sufficient nickelous sulphate, titrate back the excess of iron by permanganate of potassium.

In conclusion it may be observed that phosphoric acid is a powerful solvent for certain silicates, and even glass is strongly attacked when the temperature is raised sufficiently.

AMERICAN INSTITUTE OF MINING ENGINEERS.

A formal meeting of the officers of the American Institute of Mining Engineers was held on the 17th inst. The following officers were elected: President, John Birkinbine, Philadelphia, Pa.; Vice-Presidents for two years, S. B. Christy, Berkeley, Cal.; E. C. Pechin, Roanoke, Va.; J. C. F. Randolph, New York City; Managers for three years, J. B. Mackintosh, New York City; J. A. Porter, Durango, Colo.; J. C. Smock, Trenton, N. J.; Treasurer, Theodore D. Rand, Philadelphia, Pa.; Secretary, Rossiter W. Raymond, New York City.

The mail ballots were canvassed, and eight active and two honorary members declared elected. The latter were Prof. Bruno Kerl, of Berlin, Germany, and Prof. J. P. Lesley, Philadelphia, Pa.

THE ONONDAGA SALT WELLS IN 1890.*

By F. E. Engelhardt, Ph. D.

The annual decrease in the production of salt on the Onondaga Salt Reservation since the year 1882 has become not only a most serious matter to those who own the works and are actually interested in the salt manufacture, but also to the State of New York, since the latter owns most of the land on which the salt manufacture is carried on, and also almost all that pertains to the supply of brine. The latter item together with the inspection of the salt involves an annual expenditure of money, greater than the revenues derived from the State duty have been for the last three years. The obligation of the State towards the manufacturers does not end, moreover, with the inspection of the manufactured salt and the supply of brine from wells in operation, but it includes the furnishing of a sufficient quantity of good brine to all the manufacturers on the reservation. To accomplish this latter object the State has been liberal in the expenditure of money for new wells and during the past 21 years has, together with private enterprise, sunk and equipped at least 50 wells; 10 wells were sunk by the State in 1885 and 1886 at an expenditure of not less than $150,000. If the salt production, during the last five years (between 5,000,000 and 6,000,000 bushels), had been equal to the production of the previous five years (between 7,000,000 and 8,000,000 bushels), the absolute necessity of sinking new wells would have become apparent before now. In former reports I have called attention to the fact that the quantity of brine required on the reservation entirely governs the quality of the same, since the strong wells can only furnish a certain amount of brine, while the yield of the weaker ones is almost unlimited, due to fresh water infiltration. Though so much money has been spent in years past in obtaining good brine for the manufacture of salt, its production has steadily decreased, so much so that the year 1890 must be recorded with less than 5,000,000 bushels.

The first and primary cause of the decline of this industry was the reduction of the tariff in 1872 by the national government whereby the English manufacturers were enabled to bring their salt to New York and other seaports in the United States, and compete there with us advantageously. The second cause was the development of the salt industries in Michigan and Canada whereby a large amount of western and northern trade was taken away; a cheaper fuel and better brine enabling the manufacturers there to undersell and make a very fair profit. The third and final cause was the discovery of rock salt in the western part of New York and in Kansas and the consequent development of the salt industry in both localities. Today a new competition is springing up in Ohio along Lake Erie, where within the last two years large rock salt deposits have been discovered about 2,500 feet below the ground.

According to my brine tables, a brine of 70° salameter strength (about the average on the reservation) will yield, per ton of coal, 48·8 bushels of salt, while a saturated brine yields 77·25 bushels. Here, then, is a difference in favor of saturated brine of fully 33% (and this is borne out in the actual workings of the two brines). But suppose that the manufacturers using saturated brine make but 20 bushels more per ton of coal than producers on the reservation, it means, in money value, the bushel being taken at 5 cents, $1. To overcome such advantages neither method nor other facilities are capable, and hence the salt industry of Onondaga has to succumb, and the large amount of money invested both by the State of New York and the manufacturers, which is no less than $3,000,000, must become in a short time a total loss, if advantage is not taken of a remedy existing near at hand. Seventeen miles south of this reservation there is an inexhaustible supply of the best kind of rock salt which can furnish the Onondaga manufacturers with saturated brine in any quantity for almost all time to come.

The town of Tully, in which is situated the rock-salt deposit which furnishes the Solvay Process Company with its brine, is situated in the southern portion of Onondaga County. The town, containing four lakes, is surrounded by hills of considerable size and extent. The artificial outlet of Crooked Lake, which formerly formed the beginning of Onondaga Creek, is at present used by the Solvay Company to furnish the fresh water for dissolving the rock salt in its wells. Of the necessity of an abundant fresh-water supply for the solution of rock-salt, if the layers above the salt deposit furnish none, it is unnecessary to speak at length; but the advantage of the Tully locality above any other in the United States, as far as I know, is such that it deserves more than a common notice. The Tully lakes are some 800 feet above Syracuse, while the twenty-one wells, of which I shall speak presently, are about three hundred feet below these lakes, so that the water from these lakes not only furnishes the solvent of the rock salt, but also the power by which the saturated brine is forced to the surface and into a reservoir, whence it runs by gravity to Syracuse. This advantage cannot be overestimated, since it does away with the expense of pumping the brine. The lakes on the Tully hills, four in number, comprise an area of 537.7 acres. In the report of J. J. R. Croes, C. E., to the Common Council of Syracuse, in 1871, when it was contemplated to take the water of these lakes for a city supply, the total available water was estimated at from five to six million gallons daily.

The rock-salt deposit at this place has been revealed in the sinking of 21 wells by the Solvay Process Company.

The first well, sunk at a point near the center of the valley, had to be abandoned at about 400 feet depth, since the tube collapsed after passing into quicksand. The next well was sunk 1,400 feet east of the former. It was started in the shales of the Hamilton group, through which it passed for 718 feet, then entering the limestones of the Helderberg group and continuing in the same for about 498 feet, when a bed of rock salt was penetrated for about 45 feet, making the total depth of the well 1,261 feet. The dip of the rock, as ascertained in these borings, is 40 7 feet per mile from north to south, while the ground rises from the north to the south about 120 feet for 7,000 feet, the distance between the most northern and the most southern wells. The next well was sunk about four miles farther north. The drill hole penetrated through 244 feet of the Hamilton shales, 500 feet of the limestones belonging to the Helderberg group and finally 100 feet in red shales of the salt group, when it was abandoned.

The 20 wells now in use by the company are in groups, four wells in each group. The distance between the groups is 1,000 feet from north to south and 400 feet between the wells of the same group in the same direction, while the distance from the east to the west between the wells of a group is but 150 feet. Thus each group of wells forms a rectangle of 400 feet by 150 feet, with a well at each corner, and all the groups together occupy a rectangle 6,000 feet by 150 feet. The greater number of these wells were only sunk through the first rock-salt bed, though a second bed of 54 feet thickness was found in some of them. The results obtained in these borings are given in the following table:

Well.	Depth to salt. Ft.	Thickness of salt-bed. Ft.	Well.	Depth to salt. Ft.	Thickness of salt-bed. Ft.
A. 1	1,218	43	D. 3	1,053	48
B. 1	1,175	318	D. 4	1,053	52
B. 2	1,435	50	E. 1	1,030	53
B. 3	1,170	228	E. 2	1,040	44
B. 4	1,465	25	E. 3	1,011	61
C. 1	1,085	47	E. 4	1,023	39
C. 2	1,069	45	F. 1	1,014	35
C. 3	1,070	45	F. 2	992	47
C. 4	1,057	44	F. 3	1,012	40
D. 1	1,072	43	F. 4	974	41
D. 2	1,075	43			

From this table we may conclude that the first layer of the rock salt deposit underlying the southern part of Onondaga County is at least 43 feet thick. This is separated from a second layer of salt of 54 feet thickness by 25 feet of shales, except in those parts where the walls of group B. are situated.

The average strength of brine in the four districts of the Onondaga reservation for the season of 1890 was as follows:

	Syracuse.		Salina.		Liverpool.		Geddes.	
	Fahr.	Sal.	Fahr.	Sal.	Fahr.	Sal.	Fahr.	Sal.
Average	53·64	68·06	56·25	71·42	56·25	71·42	56·56	72·76
At 60 Fahr.	....	67·43	....	71·05	....	71·05	....	72·42

General average at 60° Fahr., 70·41° Sal.

A sample of salt made from the Tully brine at the experiment block of the American Dairy Salt Company, Limited, gave by analysis the following results: Moisture, 0·5270%; insoluble matter, 0·0204%; calcium sulphate, 1·3975%; calcium chloride, 0·0042%; magnesium chloride, 0·0089%; sodium chloride, 98·0415%.

* Abstract of annual report to the Superintendent of the State Reservation.

THE INSPECTION OF MATERIALS OF CONSTRUCTION IN THE UNITED STATES.*—I.

By Messrs George H. Clapp and Alfred E. Hunt, Pittsburg, Pa.

The practice of having structural material inspected has increased a great deal within the last few years in the United States, until at present the very largest share of all structural materials for bridges, boilers or buildings is now ordered subject to inspection, and there are several firms which make the inspection of iron and steel a specialty. Many railroad companies maintain a regular corps of inspectors, who are under the direct supervision of the chief engineer, the general superintendent or the superintendent of bridges and buildings. Of the private inspecting firms, the successful ones are mainly those whose members have served their apprenticeship either in iron and steel works or at the large bridge works; and as they have their own men constantly located at all of the principal structural and rail mills, most of the railroad companies find it more economical and convenient to employ them. Being constantly at the mills, they also become more thoroughly acquainted with individual peculiarities at the various locations, and can thus work with less friction. Several of the larger works have provided offices exclusively for the inspectors.

As regards the requirements of testing, there is a growing tendency among engineers toward uniformity, largely brought about by the publication of "Standard Specifications" by such well-known engineers as Theo. Cooper, C. C. Schneider, J. A. L. Waddell, and others; Mr. Cooper's specifications, in particular, having been adopted by a great many railroad companies and by county commissioners for highway work.

The general specifications given below are on an average compiled from those mentioned above, and from the specifications of some of the largest railroads, all strains being referred to in terms of pounds per square inch.

Specifications for Wrought Iron.—All wrought iron shall have an elastic limit of not less than 26,000 pounds per square inch, and must be tough, fibrous and uniform in character, neutral in quality and completely welded in rolling, and must have a workmanlike finish. It must be free from injurious seams, especially such as run across the fiber, and must have no blisters, buckles, cinder spots, rough or imperfect edges, or deep creases from tool or roll-guide marks.

The finished iron must be straight, and out of wind, and must not have over 2½% of variation between the actual and the estimated weights.

All wrought iron when nicked and broken at a temperature of over 50° Fahr., or when pulled apart in testing machines, must show a clean, fibrous structure, exept in the case of the webs of shape iron, which may be allowed to exhibit not over 30% crystalline in the fracture.

The finished iron must show no evidence of butt-welds, and the piles for the wide bars must have top and bottom covers and, for bars of over one inch in thichness, at least one other bar in the center of the pile double-rolled and extending over the entire length and width of the pile. Wherever bars of less width than the entire pile are used, the joints shall be well broken in the piling. Material cut too close to the crop ends will not be accepted.

All wrought iron used in tension, except wide plates, shall be made from "double" or "single" rolled iron piling pieces. Wide plates may, and preferably, have a few alternate layers of muck bar laid crosswise and extending completely across the pile. Wherever single-rolled iron and iron made from piling scrap, or from re-rolling old rails, is to be used, the items in which it will be permissible shall be individually specified in the contract.

* Abstract of a paper presented before the Iron and Steel Institute, New York October, 1890.

Specifications for Tension Iron.—All material subject to alternate compression and tension stress shall be considered as in tension.

All iron must come up to the requirements expressed in the following table, in test specimens cut from the finished material:

KIND OF MATERIAL.	TENSILE TESTS.				COLD BENDING TESTS.	
	Limit of elasticity per sq. inch.	Ultimate strength per sq. inch.	Per cent. elongation in 8 inches.	Reduction per cent. at fracture.	Angle of bend.	Diameter of cylinder around which the specimen is to be bent.
BAR IRON.						
Round bars up to 1½ in. diameter	25,000	50,000	18	25	180°	Upon itself until sides come in contact.
Round bars up to 2⅜ in. diameter	26,000	50,000	15	20	160°	One diameter of bar.
Square bars up to 1½ in. per side	26,000	50,000	18	25	180°	Upon itself until sides come in contact.
Square bars of less than 4½ sq. in. sec. area	26,000	50,000	15	20	180°	Diameter equal to the sides of bar.
Flat bars of less than 4½ sq. in. sec. area	26,000	50,000	15	20	180°	Diameter equal to 2 times the thickness.
Bars of more than 4½ sq. in. sec. area	26,000	50,000	12	18	140°	Two diameters of bar.
CHANNELS AND BEAMS.						
Test from web	26,000	47,000	12	18	140°	Diam. equal to thickness of specimen.
Test from flange	26,000	49,000	15	20	160°	"
Angle iron	26,000	49,000	13	20	140°	"
Other shape iron	26,000	48,000	14	18	120°	"
PLATE IRON.—Tests to be taken with the fiber.						
Under 18 inches wide	26,000	50,000	15	20	160°	Diam. twice thickness
18 to 36 inches wide	26,000	48,000	12	16	100°	"
36 to 54 inches wide	25,000	46,000	10	10	90°	"
Over 54 inches wide	25,000	46,000	8	8	90°	"

Earlier specifications made a difference in the requirements between material to be used in compression and in tension with the intention of ordering compression members, in the case of iron, a poorer quality, not as high in tensile strength and ductility, and in the case of steel, a harder material much higher in tensile strength and with considerably less ductility, than for tension steel. The great difficulty, however, in keeping these various grades separate, and the serious error of having the mills furnish one class of material to be used in the place of the other, have occasioned the abandonment, by most engineers, of the differing requirements for tension and compression members. However, some engineers of late have been ordering three grades of steel, which can readily be kept separate by being ordered in different ways, namely, the material for the trusses of the highest ductility and tensile strength, the latter ordinarily running from 65,000 pounds to 75,000 pounds; the material for the floor system of medium steel of greater ductility and of lower tensile strength from 60,000 to 70,000 pounds, and for rivet steel, material of not over 60,000 pounds tensile strength. The great majority of specifications in the United States, however, only require two grades of steel, that for the main members of the structure being all of one kind, the only exception being the softer steel used for rivet rods.

Specifications for Rivet Iron.—Rivet iron shall be subject to the same requirements as tension iron of the same section, and shall further be capable, without cracking or serious abrasion, of being heated to a good forging heat, and made up either by machine or hand work into rivets, and of again being heated to a good red heat, forged as in riveting, allowed to cool, and upon being nicked and cut out of the work must show good, tough, fibrous structure, without any crystalline appearance. Rivet iron shall especially be required to be neutral in character and tough in fibre *after being riveted*, and to flow well in riveting.

Specifications for Cast Iron.—All cast iron used in compression must be of best quality—tough gray iron—and must be able, in bars of 1 inch square and 5 feet length, and when supported by knife edges 4 feet 6 inches apart, to carry a load of 500 pounds without rupture, and without a deflection of more than 2 inches.

Specifications for Steel.—The method of manufacture of the steel, whether by the Bessemer, open-hearth or crucible processes, shall be distinctly specified in the contract for each item of material.

Each ingot designed to be used in the contract shall be plainly marked with the blow or heat number in the case of Bessemer or open-hearth steel, and afterwards this heat or blow number shall be stamped upon each piece of finished material rolled from it, and a portion of the whole of one full-sized ingot, from each heat or blow to be used, shall be rolled into a test bar ¾ inch in diameter. The method of obtaining the ¾-inch round test bar shall be the same with all of the heats or blows tested, and shall represent in the ¾-inch round the amount of work in the finished product as far as is practicable.

These bars are to be truly round and finished at a uniform dark orange heat, arranged to cool uniformly and without any danger of hardening from cool draughts of air, being laid on damp ground, or the like, and if any of these bars prove unsatisfactory in tests, the whole blow or heat represented by such defective bars shall be rejected.

Each heat or blow of steel to be used shall be tested first in the ¾-inch round test bar, both in tensile and bending tests required, and afterwards in specimens to be cut from the finished material; provided that the number of such tests shall not be over four in all for each melt or blow, including the test in ¾-inch round.

The tests first made on the ¾-inch test bars must exactly conform to the requirements of the specifications. The tensile tests made from the finished steel will be accepted if they give results within 4% of the requirements of the specifications.

If drillings taken from any portion of the finished material, or from the ¾-inch round test bars do not satisfactorily answer the chemical requirements of the specifications, the whole charge or blow is to be rejected, unless it shall be proved that the defect was caused by the particular ingot or bloom having been "burned" in heating.

No steel shall be used for structural purposes which contains over 0·08% phosphorus, and the average percentage of phosphorus of the steel of any given structure, or on any given order, shall not exceed 0·07%.

No steel shall be struck with a hammer or worked while at a black heat.

A variation in cross section or weight of rolled material of more than 2½% from that specified may be cause for rejection.

Finished bars must be free from injurious flaws and cracks, and must have a workmanlike finish.

Test specimens shall bend through an angle of 180°, and close down upon themselves without showing a crack or flaw, and similar bars shall have an ultimate strength of from 58,000 pounds to 68,000 pounds per square inch, and an elastic limit of not less than 36,000 pounds per square inch. Tensile test specimens shall elongate at least 23% in 8 inches, and show a reduction of area of at least 42%.

Test pieces shall be of at least ½-inch sectional area, and cut lengthwise from finished bars or shapes, or either crosswise or lengthwise from plates.

All steel eye-bars must be annealed in a properly constructed furnace, and all eye-bars must show the same degree of tenacity and ductility, proportioned to the size of the bar and different manner of testing, that the steel from the same blow or melt did in the various specimen tests on which it was accepted at the rolling mill.

Specifications for Rivet Steel.—All rivet steel shall be subject to the general specifications given above, and shall further be capable, without cracking or serious abrasion, of being heated to a good forging heat, and made up either by machine or hand work into rivets, and of again being heated to a good red heat, and forged or pressed as in riveting, and allowed to cool, and upon being nicked and cut out of the work it is in, must show a good, tough, silky structure with no crystalline appearance. Rivet steel especially shall be neutral in character and pure in composition, and shall flow well in riveting.

Rivet steel should not have over 0·15% carbon, and must not have an ultimate strength of over 60,000 pounds per square inch, and must have an elongation of at least 25% in 8 inches.

Steel rivets should not be heated above an orange color, much less than the heat put upon iron rivets, which are heated nearly to a lemon color, often without apparent injury.

The requirement for maximum content of phosphorus allowed in material has been specified differently for steel manufactured by the various methods, the highest maximum, from ·08% to 10%, being allowed in acid open-hearth steel. Most engineers are now requiring the maximum in all cases to be less than ·08%, and for Bessemer not over ·05% phosphorus. Some engineers are requiring the average of Bessemer to be less than ·04%, claiming that only Bessemer steel of this degree of purity can at all equal in uniformity open-hearth steel. For basic open-hearth steel the requirements still vary, and basic steel has not been in use long enough to have the practice settled as to what should be the requirements of the specification.

(To be Continued.)

OFFICIAL REPORTS.

Plymouth Consolidated Gold Mining Company.

An abstract of the annual report of the directors of this company for the year 1890 is as follows. In the early part of the year exploring operations were in progress in the 2d and 3d levels of the mine, and on March 1st a body of ore was encountered in No. 3, which proved to be 120 feet long and 13 feet wide. The outlook justified starting the mill, and 20 stamps were set running on March 22d, and 10 more on April 24th. In May, ore was also struck in No. 2, which at first promised very well, but proved to be only a small pocket, and by the first of October the ore bodies opened on both levels were nearly worked out. The mill was closed down in October, and has not run during the remainder of the year. Considerable exploration work has been done in the latter half of the year, in virgin ground, which has resulted in the discovery of some small but promising ore bodies.

The financial condition of the company is given in the following statement:

RECEIPTS.		DISBURSEMENTS.	
Gold bullion produced March	$2 969.90	Operating expenses:	
" April	5,055.63	Empire mine	$1,023.47
" May	6,040.37	Empire mill	21.90
" June	7,572.15	Empire—wood	.60
" July	5,649.93	Pacific mine	41,245.03
" August	6,359.07	Pacific mill	3,400.65
" Sept.	8,591.80	Pacific—development	56.60
" October	1,418.13	Water supply—canals, reservoirs, etc	6,561.82
Sulphurets reduced	9.123.07	General expenses and taxes	9,070.44
Wood sold	1,004.00		$61,979.91
From Utica Mining Company for use of mill	542.52	Surplus	22,258.93
Copper plates melted up	1,770.95	Total	$84 238.84
Surplus January 1st, 1890	28,141.42		
	$84,238.84		

This company was organized June 1, 1883, by the consolidation of the Empire, Amador, Pacific, and Plymouth companies. Prior to this time these mines had produced gold bullion to the amount of about $2,500,000. Since the consolidation, their total production of gold has amounted to $4,045,982.88. The total operating expenses of the company have been $1,682,679.05; $217,682.17 have been spent in construction, and 57 dividends, amounting to $2,280,000, have been paid to the stockholders.

Waiver of Protest.—The requirement of notice to the endorser of a negotiable note that it has not been paid by the maker is for the personal benefit of the endorser and may be waived by him, and if he pays the note after waived protest he still has the right of recovery against the maker. Where an endorser executes his own notes in payment of a note on which he is an endorser, and the holder gives up the original note and thereby releases the maker thereto from liability to him, this is such a payment by the endorser as will entitle him to recover against the maker.

Stanley v. McElrath, Supreme Court of California, 25 *Pac. Rep.*, 16.

THE RENO RAPID TRANSIT TUNNEL SYSTEM.

The need of a rapid transit system in New York has long been apparent, the facilities of the elevated railways having been entirely inadequate for several years past. With the passage of the Rapid Transit bill by the Legislature and its signature by the Governor during the past month, the question has become one of greater interest since the realization of means to supply the need comes nearer at hand. The Rapid Transit Commission appointed by the Mayor of the city has already held several sessions, at which various schemes for the solution of the problem have been presented. As these all involve questions of engineering importance, the main features of some of the most prominent systems proposed will be described in the ENGINEERING AND MINING JOURNAL. Among those which have already been submitted to the Rapid Transit Commission, is that proposed by Mr. Jesse W. Reno, M. E., of New York. The general features of his system are explained by the accompanying diagrams. The route contemplated is four tracks under Broadway from the Battery to Madison square, thence under Fifth avenue to Central Park, the express tracks to turn there and continue under Fifty-ninth street, out Eighth avenue to the Harlem River, while upper tracks continue out Fifth avenue to the Harlem River. The lower tracks will be available for trains of the proposed Hudson and East River tunnels, and will also connect with the Grand Central Railway Station in Forty-second street.

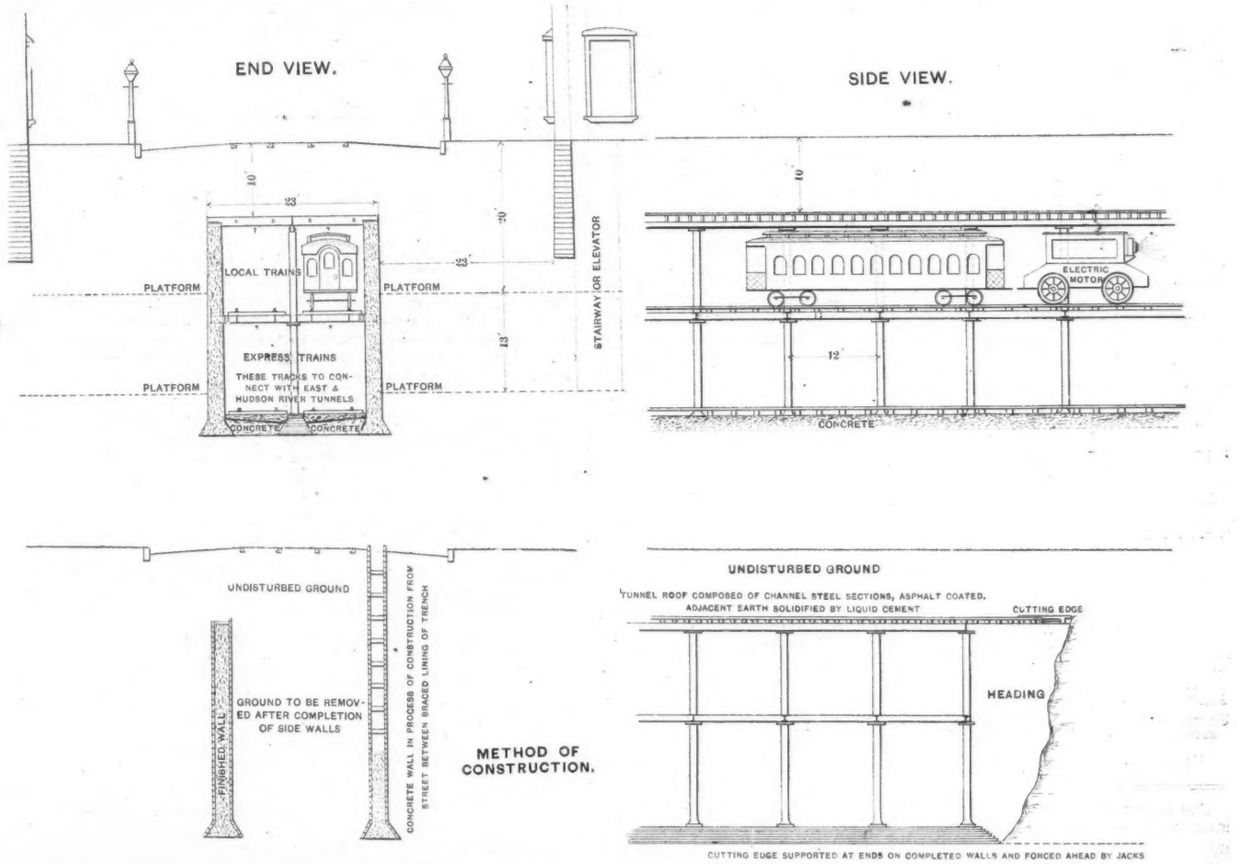
The proposed method of construction is ingenious and comparatively simple. The side walls are constructed one at a time in the following manner: A trench 3 feet in width and 38 feet in depth is excavated outside of the car tracks in the street, and the ground thoroughly supported and braced by a plank lining. The tunnel wall is then constructed by filling-in this space with the best concrete. When the wall is built to within 11 feet of the surface the plank lining is removed, the trench filled and the strip of street paving relaid. The other side wall of the tunnel is then constructed in similar manner. At points where the street is crowded a temporary covering of heavy planks can be laid over the opening, which will be about 400 feet long, and the work of sinking and building the concrete wall may go on beneath this, or the ground for the walls may be opened without obstructing traffic at all by sinking a shaft in a side street, out of the way, and drifting along the tunnel line.

The excavation of the ground between the side walls is effected without disturbing the street surface, pipes or subways, by a steel "cutting edge," which rests at each end upon the completed side walls, and is forced ahead by hydraulic pressure, while the channel-steel roof sections are built in behind it, and the construction of the internal steel structure immediately follows.

The ground adjacent to the steel roof is solidified by liquid cement forced in under pressure. This, in conjunction with the asphalt-coated steel roof, will insure a perfectly dry tunnel. The row of iron columns 12 feet apart through the center of the tunnel supports a longitudinal steel girder, upon which rest the roof sections. These iron columns are braced from the side by the transverse girders which support the track beams.

From borings and surveys that have been made in Broadway from Battery Park to Twelfth street, it is known that rock does not come nearer the surface than 43 feet. At Twelfth street it rises gradually, and at Twenty-third street is 18 feet below the surface. From the latter point to 155th street the average depth of the bed rock is 23 feet. The estimated cost of driving this tunnel from the Battery to Union square is $941,000 per mile; above Union square, $1,232,300 per mile.

The advantages claimed for this system of tunnel construction are as follows: The outside width of tunnel being only 23 feet, the side walls can be built without injury to foundations of buildings. The line of iron columns through the center of the tunnel permits the use of a flat roof, which may come within 10 feet of the surface and yet not disturb pipes or subways. The proposed method of constructing roof and driving tunnel by side channeling and small blasts insures rapid advancement, and will not unsettle the ground surrounding pipes and subways. Station platforms will be easily reached by passengers from the surface; the distance to local train platform being only 20 feet, and to express train platform 33 feet. Since there are but two tracks on each level, cars on each can be reached without inconvenience. The transverse girders will resist all pressure of the side walls of the tunnel, and the row of vertical columns through the center divides the span of the roof. The flat roof is especially adapted to the support of an overhead electric conductor, thus enabling the adoption of an electric tramway system, which has been thoroughly tested and demonstrated to be a success. The open spaces between the girders and ties, which separate the two levels of the tunnel, allow free circulation of air between stations, and consequently good ventilation. The facility with which trains can be handled by electricity will be such as to require no loops at terminals.



UNDISTURBED GROUND
GROUND TO BE REMOVED AFTER COMPLETION OF SIDE WALLS
PINNED WALL
CONCRETE WALL IN PROCESS OF CONSTRUCTION FROM STREET BETWEEN BRACED LINING OF TRENCH
METHOD OF CONSTRUCTION.
UNDISTURBED GROUND
TUNNEL ROOF COMPOSED OF CHANNEL STEEL SECTIONS, ASPHALT COATED.
ADJACENT EARTH SOLIDIFIED BY LIQUID CEMENT
CUTTING EDGE
HEADING
CUTTING EDGE SUPPORTED AT ENDS ON COMPLETED WALLS AND FORCED AHEAD BY JACKS

Three large power stations would be located along the Hudson River, where real estate and fuel are cheap, and water for condensing is plentiful. In this way power would be generated at the rate of two pounds of coal per horse power instead of ten pounds per horse power, as now required on the engines of the elevated railways.

The proposed method of construction will admit of great rapidity in driving the tunnel, as the side walls can be built in advance of the "heading," and all four tracks could be utilized in removing excavated material. With five points of attack giving ten "headings" and an average speed of 10 feet per day each, the tunnel proper could be constructed from Battery Park to Fifty-ninth street (5 miles), in 264 days. The building of the stations could be carried on while the tunnel is in progress. The form of the tunnel permits of a very convenient arrangement of stations, which are placed at street corners. The platforms are 15 feet wide and 250 feet long, and the waiting rooms 15 feet by 40 feet. The latter are entered from stairways, opening in side streets, and provision is also made for elevators.

Invention of the Compass.—Eleven hundred years and more before Christ some ingenious Chinaman, it has been affirmed, invented the mariner's compass. A writer in the *China Review*, who has been investigating the subject, now asserts that the first unmistakable mention of the compass in the Chinese records is not earlier than the twelfth century, and the instrument undoubtedly became known in Europe before the return from China of Marco Polo, who is fabled to have brought it in his baggage.

CENSUS BULLETINS ON THE COAL INDUSTRY IN 1889.

By John H. Jones, Special Agent.

MARYLAND.

The coal fields of Maryland are a part of the extensive basin lying between the Daniss and the Great Savage Mountains, extending from the Pennsylvania State line through the western section of the State to the Cheat River, near the southern boundary of Tucker County, in West Virginia, and constitute what are known as the Elk Garden and Cumberland regions. The George's Creek or Cumberland region of Maryland is located in Allegany and Garrett counties, and extends from the north branch of the Potomac River at Piedmont to the Pennsylvania State line, a distance of about thirty miles, although actual mining operations cover only about one-half that distance. The comparatively large production of coal from this limited area is furnished transportation facilities to the tidewater and interior markets by the Cumberland & Pennsylvania and the George's Creek & Cumberland railroads, which traverse the region, reaching the Pennsylvania Railroad at Cumberland and the Baltimore & Ohio at Piedmont. The Chesapeake & Ohio Canal, until its partial destruction by flood in 1889, formed an avenue for the movement of a large portion of this product to tidewater at Georgetown, D. C.

Mining operations have been conducted in this locality for about half a century. Up to the close of the year 1889 the total shipments amounted to over sixty-six million tons. The coal produced is bituminous, and, being essentially a steam fuel, the principal markets have been found at the great manufacturing cities of New England, as well as at the seaboard for the coaling of steamship.

During the census year there were in operation 31 establishments equipped for the shipping of coal. In addition, reports were received from 49 small operators supplying local trade. The total production for the census year 1889 was 2,939,715 short tons, valued at $2,517,474 at the mines, or an average of 85.6 cents per ton. The product for the census year ending June 30, 1880, was 2,228,917 short tons, valued at $2,585,537 at the mines, or $1.16 per ton. The total number of persons employed in all departments, including superintendents, engineers, mechanics and clerical force, during the census year was 3,734, and the amount of wages paid was $1,730,689. The average number of days worked when collieries were shipping coal was 196. During the calendar year 1888 the output amounted to 3,479,470 short tons. This falling off in the output during 1889 as compared with that of 1888 was due not so much to a decline in the demand as to want of transportation facilities, the result of the practical abandonment of the Chesapeake & Ohio anal.

COAL PRODUCTION OF MARYLAND IN 1889.

COUNTIES.	No. of mines.	Total product. Short tons.	Disposition of total product. Shipped by rail or boat. Short tons.	Used by local trade. Short tons.	Used at mines. Short tons.	Value of total product at mines.
Allegany— Regular estab't	30	2,931,947	2,885,114	36,684	10,149	$2,508,786
Allegany— Local mines	11	3,134	....	3,134	.....	3,827
Garrett — Regular establishments and local mines	39	4,634	222	4,412	.....	4,861
Total	80	2,939,715	2,885,336	44,230	10,149	$2,517,474

The shipments of coal, in long tons, from the George's Creek or Cumberland region of Maryland from 1870 to 1889, inclusive, have been as follows:

1870	1,628,052	1881	1,960,016
1871	2,167,482	1882	1 272,122
1872	2,148,766	1883	1 891,495
1873	2,492,726	1884	2,453,810
1874	2,254,199	1885	2,386,887
1875	2,188,436	1886	2,152,713
1876	1,718,853	1887	2,811,883
1877	1,574,339	1888	2,334,907
1878	1,688,324	1889	2.510 478
1879	1,730,658		
1880	2,069,587	Total	42,035 733

ALABAMA.

The coal fields of Alabama form the southern extremity of the great Appalachian coal fields, the northern limit of which lies along the western New York and Pennsylvania state line, which extend southwestward to Tennessee, Alabama, and Georgia. The State Geological Survey of Alabama estimates that the coal deposits of this State embrace an area of 8,660 square miles, although actual mining operations are conducted in but ten counties, viz.: Blount, Cherokee, Tuscaloosa, Jefferson, Etowah, Saint Clair, Bibb, Shelby, Walker, and Cullman. This region is divided into three distinct districts. That portion drained by the Warrior River and its tributaries and the Tennessee River and its tributaries in Alabama constitutes the Warrior coal field. The Coosa field is situated in Saint Clair and Shelby counties, and is drained by the Coosa River. The Cahaba field lies along the Cahaba River in the counties of Shelby, Jefferson, and Tuscaloosa.

The coals of Alabama embrace all the bituminous varieties, such as gas, coking, block, splint, and cannel, thereby providing the rapidly developing industries and increasing population of the State with an inexhaustible supply of fuel for furnace, steam and domestic uses.

Mining of coal was begun in this State about the year 1853, but the total output, which was produced mainly by small operators for local consumption, did not reach 100,000 tons until the year 1876. The production for the census year 1889 was 323,972 tons, valued at $476,911 at the mines. The growth of the industry thenceforward has been almost phenomenal, the product for the calendar year 1889 being 3,378,484 tons, valued at $3,707,426. The average number of persons employed during the year, including superintendents, engineers, mechanics, and clerical force, was 6,762, and the amount of wages paid was $3,175,356. The figures above given apply exclusively to the mining of coal and preparing it for shipment, all expenditures for the manufacture and handling of coke being excluded. The average number of days when mines were shipping coal was 196 during the year 1889.

The following lines of railroad traverse the coal fields of Alabama and provide facilities for the transportation of the products: Alabama Great Southern railroad; Louisville & Nashville railroad; Kansas City, Memphis & Birmingham railroad; Kansas City, Fort Scott & Memphis railroad; Georgia Pacific railway; Nashville, Chattanooga & Saint Louis railroad; East Tennessee, Virginia & Georgia railroad; East & West railroad of Alabama; Cahaba Coal Mining railroad.

The following table shows the number of mines and the total production in short tons of coal in Alabama, by counties, together with the total value and average price per ton at the mines in 1889:

COUNTIES.	Total product.	Disposition of total product. Loaded at mines for shipment on railroad cars or boats.	Used by employés and sold to local trade	Used for steam and heat at mines.	Made into coke.	Value of the total product at mines.	Av. price per ton.
Tuscaloosa	16,141	8,600	6,991	550	.....	19,795	1.23
Jefferson	2,305,383	1,399,244	39,577	42,208	824,354	2,485,744	1.08
Walker	460,254	452,274	3,950	4,030	.....	474,956	1.03
Etowah, Blount, Cullman, Cherokee	5,255	.....	5,255	.....	.....	9,278	1.77
Bibb	500,525	363,102	1,414	17,590	118,419	604,230	1.21
Shelby and St. Clair	90,946	43,619	1,497	6,312	39,498	113,422	1.25
Total	3,378,484	2,266,839	58,684	70,690	982,271	$3,707,426	$1.10

Of the amount shown above as loaded at mines for shipment, 1,868,596 short tons were delivered for consumption within the State of Alabama. The total number of regular establishments was 44; of small banks and local mines, 22. Of the former, 19 were in Jefferson County; 10 in Bibb; 8 in Walker; 4 in Shelby and St. Clair; and 3 in Tuscaloosa.

The yearly consumption of coal in the following four large iron works in Westphalia is, according to *Deutsche Kohlen-Zeitung*, about 2,700,000 tons, of which Fr. Krupp (1888) used 820,000 tons, Bochumer Verein from 700,000 to 800,000 tons, Dortmunder Union 625,000, and Gutehoffnungshütte 568,000 tons.

Spanish Mercury Mines.—The Almaden mine, during 1890, according to *Industries*, produced 50,035 flasks, against 49,477 flasks in 1889. The yield of the ore last year was nearly as much as in 1889, being just under 9·30%. Other mines in Asturias, belonging to the El Porvenir Company, produced 1,450 flasks. The yield of this ore, though only about 1% on an average, gives a profit.

Increased Use of Compound Locomotives.—According to a statement of Herr von Borries, Royal Inspector of Railroad Construction in Hanover, Germany, the number of compound locomotives in process of erection, and in use, increased, in the year from November 1st, 1889, to November 1st, 1890, from 580 to 1,034, divided nearly as follows: Germany, 430; England, including those built for South America, India, etc., 523; Italy, 2; Russia, 32; Switzerland, 11; North America, 8; street locomotives, 28: total, 1,034.

Presentation of Note Executed by Agent.—Where the word agent is affixed to the signature of a promissory note it is merely descriptive of the person and not a limitation of liability, and in order to bind the indorsers of such a note it must be presented at maturity and the demand made upon the maker, and presentation to his wife upon the averment that she was the principal for whom he acted as agent is not sufficient, although she was in fact such principal. In order to bind the endorsers of a promissory note presentation must be made strictly to the maker.

Stinson v. Lee, Supreme Court of Mississippi, 8 *South. Rep.*, 272.

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

The following is a list of the patents relating to mining, metallurgy and kindred subjects issued by the United States Patent Office:

TUESDAY, FEBRUARY 17TH, 1891.

446,411. Boiler Feeder. Josiah Austin, near East Liberty, O.

446,422. Tide and Wave Power Apparatus. Nathan O. Bond, Fairfax Court House, Va., Assignor of one-half to Frederick W. Pratt, Washington, D. C.

446,435. Direct-Acting Pumping Engine. Luigi D'Auria, Philadelphia, Pa., Assignor of one-half to Henry Martyn Robert, same place.

446,444. Link Motion for Compound Engines. William E. Good and Carl O. Linaroth, Philadelphia, Pa., Assignors to the Southwark Foundry and Machine Company, same place.

446,455. Apparatus for Desilverizing Lead. Friedrich E. L. Honold, Binsfeldhammer, near Stolberg, Germany.

446,458. Cement for Joining the Ends of Driving Belts. Carl Lochert, Berlin, Germany.

446,497. Method of Rolling Wire. Henry A. Williams, Taunton, Mass.

446,498. Roll for Rolling Wire. Henry A. Williams, Taunton, Mass.

446,526. Mill Appliance. Julian Kennedy, Latrobe, Pa.

446,532. Process of and Apparatus for Hardening Ordnance. Hiram S. Maxim, London, England.

446,582. Direct-Acting Steam Engine. John A. Groshone, New York, Assignor of one-half to John Lockwood, Jamaica, N. Y.

446,658. Ore or Rock Breaker. Charles G. Buchanan, Rockaway, N. J.

446,693. Cam for Stamp Mills. Alexander Ramage, Idaho Springs, Colo.

446,704. Magnetic Pulp Separator. William C. Edwards, Holyoke, Mass., Assignor, by mesne assignments, of one-half to Roswell M. Fairfield, same place, and Oscar S. Greenleaf, Springfield, Mass.

446,705. Steam Boiler Furnace. John T. Ellis, Toronto, Canada.

446,746. Reversing Gear for Steam Engines. Charles Swan, Corry, Pa.

446,764. Test Tram or Leveling Device for Leveling or Tramming Rolls. Joseph P. Adams, Ozark, Mo.

446,767. Magnetic Ore Separator. Charles G. Buchanan, New York, N. Y.

446,782. Safety Valve. John Loftus, Albany, N. Y., Assignor of one half to Ezra W. Smith, same place.

446,786. Method of and Apparatus for Transportation. Patrick E. McDonnell, Chicago, Ill., Assignor of one-half to L. H. Wilson, same place.

446,814. Machinery for Handling Coal. James M. Dodge, Philadelphia, Pa.

446,815. Process of making Alkaline Phosphates. Charles Glaser, Baltimore, Md., Assignor to the American Phosphate and Chemical Company, same place.

446,822. Apparatus for Supplying Compressed Air to Pneumatic Motors. Francis H. Richards, Hartford, Conn., Assignor to Eckley B. Coxe, Drifton, Pa

PERSONALS.

Mr. Henry E. Wood, M.E., of Denver, Colo., who has just returned from Europe, spent a few days in New York last week, on his way home.

Mr. Herbert Lang, mining engineer, and manager of the matte-smelting establishment at Mineral, Idaho, is in Mexico, in the interest of capitalists, who contemplate the use of the same process on Mexican ores. Mr. Lang's temporary address is Hermosillo, State of Sonora.

Mr. W. H. Patton, for many years superintendent of a number of the Comstock mining companies of Nevada, and now superintendent and general manager of the Broken Hills Proprietary, Company in Australia, who is on leave of absence is in New York and is reported very ill.

Mr. Baird Halberstadt, mining engineer, for many years one of the assistants of the late Chas. A. Ashburner on the Geological Survey of Pennsylvania, and for the past year a special agent of the Census Bureau, superintending the collection of statistics of coal in Pennsylvania, has completed his work and will return to the practice of his profession. His address is 907 Walnut street, Philadelphia.

OBITUARY.

Ben Ali Haggin, son of J. B. Haggin, died on the 17th inst. in this city, aged 38 years.

Isaac Fegley, treasurer of Montgomery County, Pa., president of the Warwick Iron Company, and interested in many enterprises, died on the 17th inst., aged sixty-five years.

Wm. A. Pullman, president of the Seaboard National Bank, of this city, died on 13th inst., aged 46 years. At one time he was quite prominently identified with Pennsylvanian oil interests.

Dr. James Croll, officer of the Scotch Geological Survey and author of "Climate and Time," "Climate and Cosmology," "Stellar Evolution," and "Philosophy of Theism," died recently in Perth, Scotland, in his 70th year. He was an authority on subjects connected with the relation of climate and geological phenomena.

Robert F. Mushet died at Cheltenham, England, on January 29th, in the 80th year of his age. He was the inventor of "Mushet's Special Steel." In 1875 the Iron and Steel Institute awarded him the Bessemer gold medal, "in recognition of his great improvements in the manufacture of iron and steel." Mr. Mushet proposed to employ manganese, which successfully removed all impediments to the then new Bessemer method. He patented another idea—the addition of spiegel iron to the contents of the converter. "By the aid of this valuable and important discovery," says Sir I. Lowthian Bell, "the 'red shortness,' which rendered Bessemer metal unmanageable in the subsequent stages of manufacture was entirely removed."

Prof. Alexander Winchell, of the University of Mich., died at Ann Arbor on the 19th inst. He was born in Northeast, Duchess County, N. Y., December 31st, 1824, and was graduated at Wesleyan University in 1847. In 1854 he was called to the Chair of Physics and Civil Engineering in the Michigan State University, and a year later was transferred to the Chair of Geology, Zoology and Botany, a position which he held until 1873, doing a large and useful work in organizing and carrying on the work of this department. In 1859 he was appointed by the State authorities director of the Geological Survey of the State, and prosecuted the duties of this position with great energy until the outbreak of the civil war arrested its further progress. When it was resumed in 1869 he entered anew upon the work, but resigned from it two years later. His paleontological researches in connection with this work resulted in the establishment of seven new genera and 304 new species, most of them fossils. From 1866 to 1869 Mr. Winchell filled a professorship in the University of Kentucky similar to that held by him in Michigan. In 1873 he resigned to accept the Chancellorship of Syracuse University, but held the place only one year, retiring to accept the Professorship of Geology, Zoology, and Botany in the same institution. From 1875 to 1878 he filled the same department in Vanderbilt University in connection with his duties at Syracuse. In 1879 Mr. Winchell was recalled to the Chair of Geology and Paleontology in the Michigan University, and this he retained until his death. He lectured extensively and contributed profusely to scientific periodicals. By his investigations he established the Marshall group in American Geology. His bibliography includes about 200 titles.

SOCIETIES.

The Railway Freight Claim Association of the Eastern, Western & Southern States will hold its annual spring meeting at Atlanta, Ga., on March, 5th, 1891.

The American Association for the Advancement of Science will hold its annual meeting in Washington, during the week August 16-22, 1891. The Geological Society of America will hold its summer meeting in the same city, during the same time.

The Bureau of the International Congress of Geologists has decided that its Fifth Session shall be held at Washington, and the date has been fixed for Wednesday, August 26th, 1891. Excursions will be made to a number of points of geological interest, and in order to arrange the expense of these, the committee desires information concerning the number of members who propose to attend the meeting. All who have that intention are requested to address S. F. Emmons, Secretary, 1,330 F Street N. W. Washington, D. C.

The Society of Black Hills Pioneers held its second annual banquet at Deadwood, Dak., on the 11th inst. The following officers were elected: President, Seth Bullock; vice-presidents, Colonel C. F. Thompson, Lawrence County; M. M. Fuller, Pennington County; F. C. Thurber, Butte County; J. F. Street, Custer County; E. T. Pierce, Fall River County; John Scollard, Meade County; J. C. Ryan, Cook County, Wyoming; J. E. Post, Western County, Wyoming; Secretary, J. H. Flynn, of Deadwood; Treasurer, John Gaston; Marshal and Historian, General A. R. Z. Dawson; Directors, P. A. Gushurst, James H. Allen, John A. Nye, James S. Brelsford, John H. McDonald.

The American Society of Mechanical Engineers is giving a series of receptions on the last Thursday of each month at its new building, No. 12 West Thirty-first street. At each of the receptions there is to be some lecture or other literary feature lasting from 8:30 to 9:30, in the audience hall. At the reception last month over one hundred persons were present, including many ladies. The special feature of the evening was a talk on the engineers' European excursion in 1889 with lantern illustrations. The next meeting of the series will be held on Thursday evening, 26th inst. It is to be called a "Fulton night," and will be devoted especially to the exhibition of portraits, autograph letters and other mementoes and relics of Robert Fulton and of early steamboating on the Hudson. A number of short addresses will be made and many old engravings and drawings will be reproduced by the lantern.

The American Institute of Electrical Engineers will hold its fifty-fourth meeting on Tuesday evening, February 24th, at 8 o'clock, at the rooms of the Institute, No. 12 West Thirty-first street, New York. A paper will be read by Mr. Oscar T. Crosby, of Boston, entitled "Data and Results of Experiments with Electric Traction at 120 Miles an Hour." A working model of an electric rail way made by Thomas Davenport in 1837 will also be exhibited in actual operation, and some interesting facts regarding its history will be given by Mr. Franklin Leonard Pope. If time permits, the reports of the Standard Wiring Table Committee and that of the Committee on the Amendment of the Patent Law will be taken up for consideration. The date of this meeting has been changed from the usual third Tuesday of the month, by vote of Council, in order to avoid conflicting with the Electric Light Convention at Providence. A special invitation is extended to members of the National Electric Light Association to attend this meeting.

The first session of the thirteenth electric light convention opened on Tuesday at Providence, R. I. President Perry opened the meeting with his annual address, and was followed by W. H. Markland, who read an interesting paper on electric lighting as applied to railway service. At a later meeting Prof. Elihu Thomson, F. H. Monks, J. E. Watkins, and others, reviewed the early days of electricity. Among other papers which were read and widely discussed were "The Ferranti System in London," by Caryl B. Haskins; "Distribution and Care of Alternating Currents," by T. C. Smith; "The Electric Arc and its Use in Lighting," by Professor Elihu Thomson, and the "Mutual Insurance of Accounts," by F. A. C. Perrine. The active members met in executive session on the afternoon of the 19th inst., and unanimously elected the following officers: C. B. Huntley, president; J. I. Ayer, first vice-president; M. J. Francisco, second vice-president, and A. J. DeCamp, A. J. Corriveau, John A. Seely, A. M. Robertson, C. R. Faben, H. H. Fairbanks, E. F. Peck, E. W. Rollins, J. J. Burleigh. The Committee on Copper Tariff was discharged with thanks, its usefulness being ended, and resolutions were adopted approving the proposition now before Congress to give an award to the daughters of Joseph Henry, to whom electrical science owes much, who, during life, received no money for his work.

INDUSTRIAL NOTES.

The Stewart Iron Company, of Uniontown, Pa. owing to the low price of iron, is said to have been compelled to temporarily close down. The Schoonmaker coke ovens are also being banked.

It is reported that the pipe works at Bessemer, Ala., are expected to start up about the first of March. They will employ about 800 hands at first, and this number will be speedily increased to 1,000.

During the 90 weeks blast of the Crawford Iron and Steel Company's Neshannock Furnace at New Castle, Pa., which just terminated, 109,790 tons of pig iron were made, an average weekly production of 1,219 tons.

The Florence Cotton and Iron Company, Florence, Ala., which is composed chiefly of Philadelphia men, is reported to have completed its blast furnace stack at Florence, and the engines have been thoroughly tested.

The Illinois Steel Company will start up its plant at Chicago, Ill., the first of next week, to its full capacity. It has received some good orders for rails, and has orders enough on its books to keep it busy for some time.

For the Anniston Pipe Works, Anniston, Ala. Mr. Walter Crafts, superintendent of the Woodstock Iron Company, was recently appointed receiver, with bonds fixed at $75 000. The intentions of those interested seem to indicate the continuation of the operations of the plant.

The Pennsylvania Steel Company, it is reported, notified eight employés of the works at Steelton that their services were no longer needed, on account of their allegiance of the Amalgamated Steel Association. It is said that more dismissals will follow as soon as proof can be obtained against the men.

John Maslin & Son, of 165 West First street, Jersey City, N. J., report that they are selling a large number of their improved balanced ball and flat valve neck pieces, rubber ball and flat pump valves and air valves, for use on pulsometer pumps, by the use of which the capacity and durability of such pumps are greatly increased, besides being greatly reduced in prices.

A dispatch from Chicago states that the stockholders of the Illinois Steel Company have voted to increase the capital stock of the company from $25,000,000 to $50,000,000. It is stated that the proceeds from the new stock will be used in greatly enlarging the plant, and that only a part of the stock is to be put on the market. The South Chicago Works started up on the 19th inst.

The Bucyrus Steam Shovel & Dredge Company, Bucyrus, O., has sold two of its largest shovels to the Cleveland Iron Mining Company and one to the Lake Angeline Mining Company, of Michigan. These shovels are made for handling hard and soft ore, and have a capacity of five tons per minute. It is claimed for them that they will load ore at about one-third the expense of hand labor.

The Edgar Thomson Steel Works of Carnegie Bros. & Co., limited, at Braddock, Pa., according to report, shut down last week for extensive repairs. Three new 15-ton Bessemer converters, a new blowing mill, a new rail mill engine, improved hydraulic machinery, and 20 new boilers will be added. With these improvements the works will be able, it is said, to turn out 1,500 tons of rails daily.

The Bethlehem Iron Company, Bethlehem, Pa., recently cast at its works a large anvil, weighing about 65,000 pounds. On the 15th inst. it was taken out of the sand in perfect condition. It will be removed at once to the mill adjoining the ordnance works and placed under the immense trip hammer. It is expected that the hammer will be in full working order by the middle of April.

The Ellis & Lessig Iron and Steel Company's works at Pottstown, Pa., according to report, went into partial operation with 40 men on the 16th inst. In the puddling department, where the strike throwing 700 men out of employment was originally inaugurated, eight puddling furnaces were started with 14 puddlers and a sufficient number of helpers. The nail factory also resumed. The men are working at the reduction.

The gypsum stucco syndicate, which is being organized to control the stucco business of the United States, has been joined by the three big mills in Fort Dodge, Ia. It is reported that Hamilton Brown of St. Paul, who is engineering the combine, says the syndicate has now secured control of every gypsum mill of any size in the United States. The organization of the combine will be completed about April 1.

Owing to the scarcity of coke many furnaces along the Lebanon Valley, Pa., it is said, are now receiving and using anthracite coal. Some are using partly anthracite, others are running on it entirely. Should the strike in the coke regions continue two weeks longer, it is predicted that every stack in the Lebanon and Schuylkill Valleys will have to resort to anthracite as a fuel.

It is reported that the rolling mill at Scottdale, Pa., employing between 500 and 600 men, resumed work in several departments last week, after an idleness of nearly two months. Indications are that operators will again be temporarily suspended, as the new engine is not working properly. The plant will, however, be idle only two or three days. The company is said to have plenty of orders for uninterrupted operations.

The Bargion Compound Rail Company, of San Francisco, Cal., through its secretary, J. E. Morris, is reported this week to have closed a contract with the Chicago & Northwestern Railway for a 20-ton lot of rails, to be shipped from San Francisco to Chicago for testing purposes. This is said

to be the first shipment of railroad construction material from California to the East, and is virtually "shipping coals to Newcastle." The rail is a California invention, and the Southern Pacific Company has had it under test in Oakland for some time.

The Carnegie Iron Company's furnace at Johnson City, Tenn., according to report, will go into blast about March 1st. This will be the first strictly Bessemer iron producing furnace in the South, and the first to use Cranberry, N. C., ore in any considerable quantity. The run will be examined by numbers of experts. If the Carnegie Iron Company can produce Bessemer pig at the rate of 125 tons per day, and as good as that the Cranberry Company is making in a small way, it is probable that extensive developments will follow in the Wautauga valley.

Some years ago the Consolidated Coal Company acquired the right from the St. Louis Coal and Machine Mining Company to use the Harrison coal cutter, and is now using about 150 of them. The Chouteau coal mining machine, which very closely resembles the Harrison, was put on the market, and perhaps twenty-five or thirty of them are now in use in the Illinois district tributary to St. Louis. Judge Blodgett's recently rendered a decision in the United States Circuit Court in Chicago, sustaining the Harrison patents, gives the Consolidated Company the sole right to use this machine in the Illinois district.

The California Wire Works, of San Francisco, has had one of its wire cables in use on a branch of the Ferries & Cliff House Cable road, in San Francisco, Cal., which has given remarkable results. The business on this branch is quite heavy. The cable crosses both the Sutter street and California street extensions, and makes seven right-angle curves besides passing over two high hills. It is considered a severe test on the cable, and such as only those of the highest quality and make can withstand. The cable above referred to was 26,500 feet long, 1¼ inches in diameter, and weighs 58,000 pounds. Six cables have been used on this line, three made in the Eastern States and three by the California Wire Works. The former had an average life of 115 days; the latter 227 days. The last one of these, on January 28th, had been in use 349 days, traveling over 50,000 miles. These cables are made in a special manner by machinery invented by Mr. Hallidie, the president of the California Wire Works.

The Chicago, Burlington & Quincy Railroad, according to a report from Alton, Ill., has definitely decided to build a steel bridge across the Mississippi River at Alton. A large corps of civil engineers has been surveying and taking soundings of the river there for two months past. It is affirmed on official authority that the contract for grading a track from a point opposite Alton down the west shore of the Mississippi into St. Louis has been let to a construction company of St. Louis. There are many reasons why the Chicago, Burlington & Quincy wants to bridge. The company now pays, it is said, $500,000 a year for the privilege of crossing the bridge at St. Louis, and as much more for the use of terminals. It has recently invested $1,000,000 in extensive property in North St. Louis, and by crossing the river here it will form a connecting link between the two great systems of the company east and west of the Mississippi. This will make the run from Chicago to St. Louis seven miles shorter than the old route, and the road will enter the city on its own ground.

SOUTHERN INDUSTRIAL NOTES.

(From our Regular Correspondent.)

The Princess Iron Company has been organized at Iron Gate, Va., with D. S. Cook, president. The capital stock is $650,000.

The Gulf Phosphate Mining & Manufacturing Company has been organized at Charleston, S. C., with a capital stock of $240,000. Its purpose is to develop phosphates on Piece River, Fla.

J. W. Womeldorf, of Cincinnati, O., and J. J. Bright, of Point Pleassant, O., have organized a company with a capital stock of $150,000, for erecting a rolling and muck bar mill at Salem, Va.

The Chattanooga Powder Company has purchased 200 acres of land at Ooltanah, Tenn., and will enact buildings for factories. There will also be established a machine shop for manufacturing iron kegs.

The Inter-State Syndicate is being organized at Athens, Ga., for the purpose of dealing in and advertising lands in Georgia and the adjoining States. Dr. E. D. Newton, of Athens, Ga., will be Secretary of the company.

An ice factory, with a daily capacity of fifteen tons, is being erected at Atlanta, Ga. The plant is constructed on the absorption plan and will cost about $30,000. The machinery will be made by the Columbus Iron Works, of Columbus, Ga.

The People's Fuel and Gas Light Company has been organized at Memphis, Tenn., by Allen Asher, B. M. Stratton, J. F. Fargason and others. A plant for the manufacturing of fuel and gas lighting by the Fahneljeln process will be erected, which will cost about $300,000.

An electric railway will be built from Rutherfordton, N. C., to Asheville, N. C. The charter has been granted by the Legislature, and work upon the construction of the road is to be immediately commenced. The power will be taken from Broad River, from which, it is claimed, 50,000 horsepower may be had.

The Edison General Electric Company, of New York, has secured the contracts for constructing an electric road three miles long in Savannah, Ga.; the electric street railway lines in Charlotte, N. C.; the Raleigh electric railway at Raleigh, N. C., and a double track electric railway for the Rivermont Company, at Lynchburg, Va.

A. E. Randle, of Washington, D. C.; Cyrus W. Field, Jr., of New York; Wm. R. Martin, Oscar C. Brothers, J. Walter Head and T. M. Miller, of Mississippi, have incorporated the Delta Cotton and Rolling Mills at Carrolton, Miss. The company has bought the plant of the Carrolton Cotton Mills, which has been idle for years. New machinery will be put in and operations resumed at once. The capital stock of the company is $1,000,000.

The Lady Ensley Coal, Iron & Railroad Company, of Sheffield, Ala., mentioned in our last issue, will have a capital stock of $3,000,000. The officers of the company will be Colonel Ensley, President; W. W. Moore, General Manager, and Thos. D. Radcliff, of Sheffield, Secretary and Treasurer. Into this company has been consolidated the Ensley furnaces of Sheffield, the iron ore mines of Sheffield district, and the coal lands and coke furnaces of Horse Creek.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from his office. No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

2,071. A machine to make shingles by hand. Alabama.

2,072. Portable houses. Colorado.

2,073. Complete outfit of brick machinery, dry kilns, etc. Virginia.

2,074. Assay balance complete, with weights; also a portable crucible furnace for assaying ores, either new or second-hand. Georgia.

2,075. Machinery for sawing walnut lumber in thin pieces. Pennsylvania.

2,076. A small plant for a knitting factory. Indiana.

2,077. An ore crusher, smelters, etc. North Carolina.

2,078. A small screw-cutting geared lathe, with or without foot power, new or second-hand. One that will swing four or five inches and from 15 to 20 inches between centers. Colorado.

2,079. Pony planer, shaper, mortiser, borer, knife grinder, planer, molding bits, shiner heads, carver, etc. Florida.

2,080. Electric light plant, with power sufficient to run 100 street and 50 commercial lights all night. Tennessee.

2,081. Second-hand steel rails, 15, 20, 25, 30 and 40 pounds. Pennsylvania.

2,082. A slow speed dynamo. Illinois.

AMERICAN GOODS WANTED ABROAD.

2,068. From one to four miles good second-hand 25 or 30 lb. steel rails, delivered Buffalo or Detroit, for shipment into Canada.

2,068A. Catalogues and price lists of crabs, derricks, winches, cranes or other suitable machinery for handling very heavy boulders. Mexico.

2,083. Chaser mills for pulverizing materials of several kinds. Canada.

2,084. An importer and dealer in mica, asbestos, graphite and rutile desires to enter into correspondence with miners and producers of these minerals with the object of buying their products. Belgium.

2,085. A second-hand 50 H. P. engine, tubular boiler, planer, matcher and four-side, eight-inch molder for a seat and body factory. Ohio.

GENERAL MINING NEWS.

When the United Mine Workers' Convention met at Columbus, Ohio, Saturday, the 15th inst., the committee on scale of prices submitted the following report, which was adopted:

District A—Anthracite region, Pennsylvania, an advance of five cents a ton, net; district 2, Central Pennsylvania, an advance of five cents; district 5, Monongahela River, 99 cents per ton for screened coal, and 69 cents for run of mine. The committee recommends that the districts have power to make rates for local trade in a radius of 40 miles from Pittsburg. District 6—Hocking Valley, 80 cents for screened coal; 60 cents for run of mine. District 11—Indiana, 85 cents for screened coal; 65 cents for run of mine, and 80 cents for channel coal. District 12—Illinois, Braidwood, $1.02; Streator, 90 cents; Lasalle, $1; Peoria, 85 cents; Stoneton and Mount Olive, 65 cents; Belleville, 66⅔ cents; Harrisburg and Equality, 72½ cents; Spring Valley, $1; Springfield, 72½ cents; Wilmington (10 cents additional for dead work). District 13—Iowa and District 14 Missouri and Kansas, 16 cents advance over present prices. District 16—Maryland, 50 cents per net ton. District 17—West Virginia, Kanawha river 75 cents, Pomeroy, 57; Moundsville, 60; Flat Top 40 (run of mine); Fairmount and Coal Valley, 50 (run of mine); Coal Valley 62 (screened coal). District 18—Kentucky 65 cents run of mine. District 20—Alabama, Pratt and Wheeling mines 50 cents; Blue Creek 45; Coalburg 50 to 60; Warwick 75. District 22—Indian Territory—Lehigh Coal Gate, Kreba, McAllister, Anderson and Hartshorn 4 4-5 per bushel for screened coal and 3 9-10 cents run of mine; Jenny Lind, Coal Gate and Lloydsville, 99 cents. The committee recommends these prices for machine mining to be fixed at 12½ cents below price of pick mining. This scale is a general advance of about 10 cents in each district.

ALABAMA.

(From our Special Correspondent.)

The mine owners and operators of the Birmingham district are making a fight against the new mining laws, claiming that they will ruin many of them if all the requirements are rigidly enforced. One of the companies estimates the expense of changing its mines to conform to the law will be about $500,000. The total length of its shafts, slopes, heading, etc., is about 100 miles, and will all have to be enlarged in order to comply with the new law. It is a noteworthy fact that there have been very few accidents in this section that have been attended with serious loss of life.

MOBILE COUNTY.

C. W. Montgomery, of Iron Mountain, Mich., has been prospecting in the neighborhood of Mobile for some time for iron. He began boring about nine miles north of the city, and at a depth of 22 feet struck a body of brown hematite ore said to be 45% metallic iron. He has purchased land in the vicinity and will develop it.

ALASKA.

At a meeting of the House Committee on Military Affairs, held on the 17th inst., Chairman Cutcheon was authorized by the committee to use all legitimate parliamentary means to secure the passage of the Senate bill appropriating $100,000 for an exploration, under military auspices, of Alaska. Gen. Cutcheon is quite confident of the final passage of the bill before the close of the session.

ARIZONA.

YUMA COUNTY.

A strike of high-grade gold ore is reported in the Eagle Tail Mountains, 50 miles southwest of Phœnix. It is located along the stage line to the Bonanza camp in the Harqua Halas.

Another discovery of vanadium is reported in a mine near the southern boundary line of this county. A similar property which has been opened near Agua Fria is said to be capable of supplying the entire demand of the world for this metal. This, however, is not large. The mill concentrates at the Phœnix mine have also been found to contain a considerable quantity of this rare element.

CALIFORNIA.

(From our Special Correspondent.)

An ingenious method has been devised here by means of which payment of the duty on ore is avoided and the revenue deprived of large sums of money. An investigation has not yet been made, and consequently it is not known to what extent the fraud has been perpetrated. Until the new tariff went into effect imported ores upon arrival were weighed in bulk, silver and gold ore being free of duty as now. It frequently occurred that such ore contained a large percentage of lead, which in this way was admitted free, and to cover such cases the McKinley tariff provides "that silver or other ores containing lead shall pay a duty of 1½ cents per pound on the lead contained therein, according to sample and assay at the port of entry."

Some time ago a local importer desired to take samples of ore from all the sacks consigned to him, in order to have an assay made which would yield an average sample of the entire lot, and thus enable him to arrive at an estimate of the value of the ore for selling purposes.

The authorities at Washington, upon the request being submitted to them, insisted upon the usual method of sampling being followed. The appraiser will, therefore, continue to pick out a few lumps of ore from any of the sacks and have it assayed. The return made regulates the duty fixed upon the entire lot.

Advantage has been taken of this method to evade paying any duty at all and if the authorities do not change their mode of sampling the loss to the government will be very considerable. Silver, gold, and lead ores come here from Mexico in sacks

or hide covers, and the shippers knowing that assays are made from lump, taken from the top of the sack, and that silver ore is admitted free, do not fail to see to it that silver ore always does fill the mouth of each sack to the extent of some inches; underneath, the body of the sack is filled with lead ore. A sample being taken in the ordinary way and assayed the result shows it to be silver ore, and in this way the whole consignment of lead ore is let loose duty free.

COLORADO.

COLORADO COAL AND IRON COMPANY.—A special meeting of the stockholders of this company will be held at the office, in Colorado Springs, on April 6th, for the purpose of considering a proposed amendment to the articles of incorporation changing the principal office of the company from Colorado Springs to Pueblo. The amendment, it is said, will probably be adopted, as the New York and Philadelphia capitalists who are interested in the company are strongly in favor of the change. The company is erecting 75 new coke ovens at Crested Butte to supply the increased demand for the product at Denver and other places in the vicinity. When these ovens are completed the number owned by this company will be 500. The company last year produced 150,000 tons of El Moro and Crested Butte coke and 950,000 tons of coal.

ARAPAHOE COUNTY.

CARD CONCENTRATOR COMPANY.—This company has been incorporated by William L. Card, Albert Blair and Charles H. Scharman, to manufacture, sell and operate mining machinery. The capital stock is $300,000, divided in shares, $1 each. The chief office will be at Denver.

CLEAR CREEK COUNTY.

HOMER SILVER MINING COMPANY.—This company has been incorporated by David Street, James Henshall, Thos. C. Fenlon, Jr., John M. Platt and Alexander Mayors. Capital stock $300,000. Principal office in Denver. The company's property consists of the Silver Questions, St. Julian and other lodes above the Seven-Thirty Mine on Sherman and Brown Mountains.

SHIVELY MINING COMPANY.—This company has been incorporated by Robert L. Belknap, William L. Patton and Walter Edwards of New York City, and Warren M. Fletcher of Georgetown. Capital stock $100,000. Principal office is at Georgetown.

STEVENS.—A force of 70 men is at present employed in this mine, which is producing a large amount of rich galena ore. About 200 tons are stocked at the mine awaiting shipment. The eighth and eleventh levels east and west, the twelfth level east and west and the fourteenth level west are being pushed ahead and are opening new ore bodies. In the ninth level west, on the St. George vein, there is a fine breast of dry ore assaying high in gold and silver. The main raise from the new tunnel level, to connect with the old shaft from the ninth level, having been finished, the ventilation is complete, and a block of ground 1,500 feet in length and 1,000 feet in depth is now being drifted into at various points, and with few exceptions these drifts show ore in paying quantities. The output of this mine has been steadily increasing for several years, and its appearance at the present time indicates that a still larger production will be made in the near future.

CUSTER COUNTY.

BULL DOMINGO MINING COMPANY.—It is reported that a new ore body has been opened in the old Bull Domingo mine. It is stated to be 30 feet thick, with width unknown, although already opened for 70 feet. The mine is at present being worked by lessees.

GEYSER MINING AND MILLING COMPANY.—We are officially informed that a small seam of mineral, assaying high in silver, was cut last week in the east cross-cut. Numerous rich seams of this kind have been found in the property of this mine, but, unfortunately, never enough ore to pay to work.

EL PASO COUNTY.

SOCORRO FIRE CLAY COMPANY.—This company has been incorporated by William T. Varker, Horace G. Lunt and Edward C. Davis. The object of the company is to explore, acquire, sell, lease, develop and manage clay bearing land in the State of Colorado and territory of New Mexico. The capital stock is $250,000, divided into 2,500 shares of the value of $100 each.

GILPIN COUNTY.

BATES-HUNTER MINING COMPANY.—A meeting of this company was held on the 12th inst., at which the following were elected directors: Charles E. Taylor, M. E. Smith, E. B. Hendrie, George Kohn, S. V. Newell, C. N. Perkins and W. R. Rathvon. The directors chose the following officers: President, Charles E. Taylor; vice-president, M. E. Smith; treasurer, E. B. Hendrie; secretary, George Kohn; manager, S. V. Newell.

PITKIN COUNTY.

ASPEN.—A force of about 275 is being employed in this mine, and a somewhat larger output is being made. Weekly shipments from the property amount to about 900 tons.

DELLA S. MINING COMPANY.—This company has been organized to operate the Della S. mine on Aspen Mountain. Its capital stock is $1,000,00 in $10 shares. The directors are D. R. C. Brown, H. R. Woodward, G. B. Brown, E. T. Butler and F. J. Hooper.

RIO BLANCO COUNTY.

It is reported that petroleum in paying quantity has been found in this county. The location of the discoveries is close to the line of the Ute Indian reservation, and about eight miles below Rangely, the last-settled point between Meeker and the State line. It has been known for some time by the settlers that oil exists at this point, but no efforts have been made, owing to the lack of both funds and knowledge, to prospect to any extent, until the fact reached the ears of several Denver capitalists, who lost no time in sending experts to the region, with the result that over 2,000 acres of land were located and at once placed on record with the county clerk.

SAN JUAN COUNTY.

SAMPSON.—It is reported that this property is about to pass into the hands of a Welsh syndicate, now in process of organization under the direction of Charles E. Jones and C. W. Morgan. This is a large gold-bearing vein which has been opened for several hundred feet by drifts showing large bodies of free milling quartz. The mine is already in shape to employ 100 men and a large output could be made. Being fitted with a powerful wire rope tramway the ore can be delivered automatically under the stamps in the company's mill, it is claimed, at a cost not to exceed 25 cents per ton. The capacity of the tramway is 150 tons and the capacity of the mill—25 stamps of 850 pounds each—75 to 100 tons daily. The lowest grade of ore that ever went through this mill averaged $11 per ton, while the average of the whole product is in excess of $18 per ton.

FLORIDA.

MARION COUNTY.

(From our Special Correspondent.)

THE EAGLE PHOSPHATE COMPANY.—This company has been incorporated—A. S. McCreath, of Harrisburg, Pa., is President; A. J. Done, of Harrisburg, Vice-President, and A. W. Burnes, Secretary and Treasurer. The company will develop phosphate mines in this county.

POLK COUNTY.

WHITTAKER PHOSPHATE AND FERTILIZER COMPANY.—This company has been incorporated at Homeland, with a capital stock of $500,000. It will develop the Peace phosphate lands.

GEORGIA.

LUMPKIN COUNTY.

(From our Special Correspondent.)

DAHLONEGA GOLD MINING COMPANY, LIMITED.—J. H. Weaver, who has recently been appointed temporary receiver of this company, is offering the water from its ditch, the Singleton, for sale at 6 cents per miner's inch to persons desiring it for mining or prospecting. The sheriff of Lumpkin County has levied upon a 40-horse-power portable engine and boiler with connections, one 30-horse-power semi-portable boiler and one Blake pump and line of discharge pipe, at the Fish Trap mine, belonging to this company.

GEORGIA HOME STAKE MINING COMPANY.—This is a new company organized for the purpose of sluicing a lot about a mile and a half northeast of Dahlonega. A flume and pipe line 350 feet long, connecting with the Singleton ditch, is being placed in position.

TEAL-ADAMS GOLD MINING COMPANY.—Wm. Skyrme has brought suit against this company to foreclose a mortgage on its property. It appears that on the 9th day of August, 1890, this company, by Wm. Robb, its president, made a promissory note for the sum of $3,000 to Skyrme, payable in 30 days, with interest, and which now the company refuses to pay. The mortgage is on a tract of land, lot No. 122 (except five acres in the southeast corner) containing 250 acres, together with all the buildings and improvements thereon, and given for the purpose of securing the payment of the aforesaid promissory note.

IDAHO.

ALTURAS COUNTY.

ELK CREEK MILLING AND MINING COMPANY.—At a recent meeting of the stockholders of this company, held in Salt Lake City, the following gentlemen were elected directors: E. J. Caldwell, J. J. Cushman, O. S. Matthews, D. J. Hoge and G. W. Wilderman. The property is situated 14 miles from Hailey, adjoins the famous extension to Camas No. 2 and is said to be an exceedingly promising property.

SHOSHONE COUNTY.

CŒUR D ALENE MINING COMPANY.—According to report one of the largest installations of electrical machinery in the Northwest has recently been put in operation at the Poorman mine. Patrick Clark is manager. It is an electrical power transmission plant used to transmit power from a water wheel, located a mile and a quarter up the cañon, to their pump, hoist, mill and all the machinery connected with the mine. This shipment of electrical works comprised seven car loads, and is without doubt one of the most complete and extensive in the United States. According to estimate, it will save the company a large sum every year.

KANSAS.

CHEROKEE COUNTY.

A special report shows that during the week ending February 14th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,254,940; zinc ore, pounds sold, 707 620; lead ore, pounds sold, 194,080. Sales aggregated a total value of $11,637.

MICHIGAN.

MICHIGAN LAND AND IRON COMPANY.—The annual report of this company shows sales of pine timber for the year to the value of $45,315, making $1,425,927 from the beginning. Options on June to the amount of $330,721 were outstanding December 31; and the value of pine not under option was placed at $940,000. The outlook for sales in 1891 is promising. The company paid $111,500 in dividends in 1890. The assets and liabilities December 31 were:

ASSETS.		
Lands		$2,500,000
Accounts receivable		243,616
Atchison 4s at cos	$16,971	
Atchison incomes	15,280	
Current River 5s	8,000	
C., B. & Q. Nebraska 4s	70,000	
		92,145
Cash		398
Total		$2,836,165
LIABILITIES.		
Capital stock		$2,600,000
Suspenses account		50,246
Revenue		185,919
Total		$2,836,165

COPPER.

The January output of mineral made by the Lake mines is 5,936 tons, against 5,012 tons in January 1890, 4,728 tons for the same month 1889, and 3,685 tons in January, 1888.

CALUMET & HECLA MINING COMPANY.—The Calumet *News* states that the management has decided to sink this company's Red Jacket vertical shaft to a depth corresponding to the 40th level of the old mine.

PEWABIC MINING COMPANY.—Advices from Marquette state that Judge Stone, counsel for the Demmon party, has filed exceptions to a confirmation of the sale of the Pewabic property. It is thought that the issue will be brought before the U. S. Supreme Court. In our issue of Jan. 31 we gave a full report regarding this company's past history.

IRON.

We are in receipt of an illustrated volume bearing the caption, "Escanaba, Mich., U. S. A., the Iron Port of the World." Its one hundred pages are devoted to a description of the industries of this thriving city, principal among which are the iron ore shipping interests of the Chicago & Northwestern Railroad Company, which has made this port so famous. The work is a credit to its publishers, the Calumet Printing House.

MENOMINEE RANGE.

CHAPIN.—The event of the week has been the purchase of the Chapin mine by strong New York capitalists. The newspapers have had plenty of erroneous rumors of late concerning the sale of all the Schlesinger mines to these gentlemen. The only mine purchased was the Chapin, and the price paid for it is not made public, but it was much less than those given in the published reports.

HAMILTON ORE COMPANY.—The old shaft house at No. 2 has been replaced by a new and larger one. The ore, it is estimated, lies vertically 1,900 feet from the surface; 900 feet of this distance has been traversed during the past 15 months.

LUMBERMAN'S MINING COMPANY.—This company has 11,000 tons of ore in stock at the Ludington mine. As will be remembered by our readers, says the Norway *Current*, during a greater portion of the months of December and January anchor ice at the hydraulic works prevented a full supply of air, and little or no hoisting could be done. During this time "C" shaft needed repairs and received them in a thorough manner, and shaft "A" was also retimbered for about 100 ft. of its depth. Shaft "A" is nearly down to the 14th level and shaft "B" will be finished to the 10th level in a short time. The new machinery at "B" is being placed, and the new shafthouse and pockets are in course of construction. The shafthouse will be 105 feet high. The capacity of the four pockets will be 700 tons.

MILLIE MINING COMPANY.—It is understood that all negotiations between the Schlesinger people and this company looking toward a sale of the property are off.

PEWABIC MINING COMPANY.—A new compressor and hoisting plant is being put in at this company's mine. A new brick engine house is about completed, and a sawmill has been built this winter. About 400 tons of ore are being hoisted daily, and drifting to the ore body from the third level eastward is progressing at the rate of 45 feet per month. The drift will probably reach the ore in about five weeks.

SOUTH MASTODON.—This mine was closed down recently, owing to the slackness of the market and the change of ownership which is reported as about to take place.

MARQUETTE RANGE.

(From our Special Correspondent.)

MARQUETTE, Feb. 17, 1891.

DETROIT MINING COMPANY.—A meeting of the directors was held in Detroit on Wednesday, the 11th inst. The annual meeting will be held at Detroit, March 15th, and instructions were given to Superintendent Thomas to keep the mine clear of water until that time. Steps will then undoubtedly be taken to effect a sale of the mine, as the present owners are indisposed to expend any more money in explorations.

ELBA MINING COMPANY.—The directors have given orders to have the company's shaft sunk 100 feet for the purpose of attacking the ore at a lower level. This week a sump was made near the shaft in the north drift. A No. 5 Knowles will raise the water to the surface. Sinking will be commenced early next week, and four weeks will be required to reach the second level. The drift 50 feet south is breasted in fine ore. The west crosscut from the north shaft has passed through the ore, piercing a lens 20 feet wide. There is reason to believe that the ore will be found much nearer the shaft in the second level.

QUEEN MINING COMPANY.—A Worthington pump, with duplex 10 × 24-inch steam cylinders and 15 × 25-inch water cylinders, will be soon a part of the equipment of the East Negaunee group, of which the Queen is the principal mine. It is now on the ground.

MINNESOTA.

IRON.

MYRNA IRON MINING COMPANY.—This company was incorporated at Duluth recently by T. H. Presnell, Frank Hoibbing, Richmond D. Mallett, Alexander J. Trimble and Frank I. Tedford as incorporators. The capital stock is $200,000; shares $2 each. The property lies just north of and adjoining the Mallman mine. It was formerly operated by the Eureka Mining Company. The new organization was effected for the purpose of bringing in more capital.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

JOPLIN, Feb. 16.

All the ore buyers in this district were in the market last week for all the ore they could buy at the reduced price of $22 to $22.50 per ton for zinc, and all indications now are that prices will soon advance. Lead ore held its own during the week at $24.50 per thousand. Following are the sales from the different districts, as far as reported:

Joplin mines, 1,847,070 pounds zinc ore, and 172,050 lead, value $24,510. Webb City mines, 1,216,190 pounds zinc ore, and 65,899 pounds lead; value, $14,993. Carterville mines, 1,114,160 pounds zinc ore and 92,310 pounds lead; value, $13,416. Zincite mines, 198,910 pounds zinc ore and 480 pounds lead; value, $2,201. Lehigh mines, 130,400 pounds zinc ore; value, $1,495. Oronogo mines, 40,100 pounds zinc ore; value, $450. Sherwood mines, 2,960 pounds zinc ore; value, $33. Galena (Kansas) mines, 707,620 pounds zinc ore and 194,080 lead; value, $11,630. Aurora mines (Lawrence county), 290,000 pounds zinc ore, 560,000 pounds silicate and 165,000 pounds lead; value, $11,403. Total of lead and zinc belt, $80,131.

Spelter output of Pittsburg and Wier City, Kans.: R. Lanyon & Company, 183,000 pounds; S. H. Lanyon & Bro., 96,700 pounds; Granby M. & S. Company, 96,600 pounds; W. & J. Lanyon, 96,800 pounds; Wier City Zinc Company, 146,000 pounds; total, 619,100 pounds. The coal output for same week was 910 cars, aggregating 18,200 tons.

The most important mining land transaction of the week has been the purchase of a 1,000-acre tract of land by O. H. Picher, W. H. Picher, H. L. Newman and others. This deal has been pending for some time, but was finally closed at $150,000. The purchasers will organize a stock company and commence development at once. This valuable tract of land is located one and one-half miles southeast of the city of Joplin, and is almost entirely undeveloped, except that enough prospecting has been done to prove the existence of lead and zinc ore.

Collins & Petersen's mine on the Toucher land is improving, and last week turned in 37,620 pounds zinc ore. Williams & Oree's mine on Turkey Creek produced 120,000 pounds of clean zinc ore. The Sterling Land and Zinc Company's land produced during the week 60,000 pounds zinc ore, and 5,610 lead. It is estimated by competent persons that there is now in stock in this district from 7,000 to 8,000 tons of zinc ore.

MONTANA.

BEAVERHEAD COUNTY.

BIG HOLE PLACER MINING COMPANY.—This company was originally orgaized some four or five years ago in Salt Lake City, and much work has been done on the property, located at the head of Big Hole River, some 50 miles northwest of Dillon. About 30 miles of ditches and flumes have been put in, and all is now in good shape for running as soon as spring opens. The improvements have cost between $50,000 and $60,000. The placers extend a distance of over twelve miles, with the gravel from 10 to 30 feet deep, and it is said to run from five to 22 cents per pan. The company is capitalized at $1,500,000 in $10 shares. This stock is distributed among a large number of holders, and has been bought and sold at various prices. The result of a short run last year was estimated worth from five to $6,000. The season in the Big Hole is not very long, however, and varies between three and four months, according to the amount of snow on the mountains at the head of the river.

DEER LODGE COUNTY.

BI-METALLIC MINING COMPANY.—A party composed of Paul A. Fuscz, L. M. Rumsey, C. D. Mc Lure, J. M. Merrell, J. Green and Capt. Buffinger arrived recently at Philipsburg. The advent of these gentlemen gave rise to a good deal of speculation as to the probable cause, and the possibility of a smelter for Granite Mountain ores is spoken of. Regardless of the smelter project, the company is reported to have already decided upon adding 50 stamps to its mill at Clark, and it is understood that work will be commenced on the addition in the course of a month or six weeks, or sooner if the weather will permit. When the original mill was built the plans were drawn for 100 stamps, but only 50 were put in. For some time past, however, the necessity of greater milling capacity has made itself felt, and the ore in sight is said to justify such an addition.

LEWIS AND CLARKE COUNTY.

ELKHORN MINING COMPANY, LIMITED.—The official report of Captain Plummer] states: "Mill worked 30 days during month of January and crushed 980 tons of ore-producing bullion amounting to $36,325; smelting ore produced 281 tons of the value of $16,830. Total produce, $53,155. Total expenses, $21,810. New hoisting machinery has been received and is in course of erection." The latest reports state that a new ore body has been discovered in the 1,050 level north of the shaft, which is now 5 feet wide and assays $75 per ton.

MONTANA COMPANY, LIMITED.—The official report for January shows that the total weight of ore crushed during this month was 7,204 tons; yield from the three mills, $81,500; working expenses for the month, $58 800. The estimated number of ounces contained in returns by assay being gold, 2,985 ounces; silver, 15,348.

MEAGHER COUNTY.

MONTANA GOLD, SILVER, PLATINUM AND TELLURIUM MINING COMPANY.—A tunnel run by this company across the country formation is in about 300 feet. The first vein was encountered 100 feet from the mouth and has been drifted on both ways. The vein in both drifts carries from two to three feet of ore that samples as high as $800 per ton and seven feet of lower grade running about $40. According to report both drifts are being pushed ahead and the ore is sorted for shipment. Work contiaues too in the face of the tunnel, which looks well. The rock is softening and water is coming in freely. This, it is supposed, will be the extension of a six-foot cropping, and will no doubt prove large and rich when tapped. The Flora lead is 300 feet beyond and will thus be cut 700 feet below surface. The working force is increased as developments warrant and will probably embrace over 100 men by next summer.

MISSOULA COUNTY.

BELL STOW.—This mine was located near Thompson Falls, in 1884, by a prospector sent out by Captain Anderson, and was afterward stocked for $300,000. As the property was not paying its way at that time, it was necessary to assess, and finally the mine was sold by the sheriff and bought by Captain Anderson. Last fall the latter bonded the property to Paul Blackmar, a Minneapolis lumber man, for $20,000. Mr. Blackmar has associated with himself four other Eastern capitalists, and at once started 30 men on development work. Captain Anderson is now owner of the mine, but it is reported that Mr. Blackmar and his associates will have it transferred to them at the expiration of their bond, and will continue to develop the property.

BUCKEYE MINING COMPANY.—The property of this company is located on Thompson River, six miles from the Northern Pacific, and consists of the Ohio, Climax, Paymaster, Treasury and Pay Grit claims. The purchase from the original discoverers was made by Helena parties about a year since, and papers of incorporation were immediately afterward filed. The officers are: Charles Jefferies, president; H. H. Davis, secretary; A. B. Cook, general manager. Most of the development has been on the Ohio claim. This mine is reported to have been a paying one from the grass roots, the ore being unusually high grade, and over 600 feet of tunnels and winzes have been driven. The upper tunnel, No. 1, is in 66 feet. No. 2 tunnel was driven 40 feet to the south when the ledge was cut, and later all drifts have been run in the vein. The east drift is 92 feet in length and the west 65 feet. The lower tunnel, No. 3, is the present main outlet and is in 265 feet. It starts on the Climax, but runs into the Ohio ground. A 91-foot winze connects this with No. 2 and gives good ventilation to the mine. No. 3 is being pushed ahead as rapidly as possible and shows in the breast 18 inches of chloride ore, as rich as any in the mine. The end of the tunnel is about 160 feet below the croppings. In the neighborhood of 40 sacks of first-class ore are daily shipped, and considerable second class, averaging between 50 and 60 ounces silver, is accumulating on the dumps awaiting shipment in the spring. The first class ore averages 120 ounces of silver and 36% lead.

SILVER BOW COUNTY.

BETSY DAHL.—A new pump is reported to have been placed in the shaft of this property, which is in the heart of Meaderville. A body of high grade copper silver ore was recently opened up at the 250-foot level. When part of the property now held by the Boston and Montana Company belonged to the old Montana Copper Company the Betsy Dahl was located as placer ground. The subsequent quartz location gave rise to a suit which has now reached the U. S. Supreme Court, and up to a short time ago it was stoutly maintained that no quartz existed within the boundaries of the claim. Present developments seem, however, to indicate that Mr. Dahl was correct in persevering. Whether he will be able to get a clear title is another question.

OLD GLORY.—During the last two months no ore has been taken from this mine, but underground development has continued. The shaft has been sunk to a depth of 300 feet, from which point the ledge was tapped and drifted on west. No pay ore was struck, however. Such a barren zone has been encountered at about the same depth in more than half the silver mines of the camp, but deeper the ore appears in larger and richer bodies. About $50,000 worth of ore was extracted from the 200-foot level, and some was found below, but at the 300 the ledge is very large and almost barren. The claim lies just west of the Mountain Consolidated, one or the largest producers of the Chambers syndicate, and for that reason lessees are loath to give up hope of richer returns further down. Sinking will soon be commenced again.

NEVADA.

ELKO COUNTY.

(From our Special Correspondent.)

SAN FRANCISCO, Feb. 12.

BELLE ISLE MINING COMPANY.—Assays from the face of the south drift, 450 level west crosscut, have improved considerably. The drift has been extended 24 feet and the west crosscut, same level, has been extended 18 feet.

NORTH BELLE ISLE MINING COMPANY.—The north intermediate drift from No. 4 chute has been extended nine feet, showing a good width of solid sulphuret ore. The concentrating mill has been temporarily closed down.

NORTH COMMONWEALTH MINING COMPANY.—On the second level the south drift has been advanced 20 feet. Ten carloads of ore averaging $260 per ton and 50 carloads averaging $31 per ton were hoisted during the last week.

ESMERALDA COUNTY.

HOLMES MINING COMPANY.—The annual meeting was held on Tuesday, when the large number of 90,404 out of 100,000 shares of stock were represented. The following directors were elected: W. J. Suthe land, Ramon E. Wilson, John M. Burling, Israel W. Knox and J. E. Condit. The following officers were subsequently elected: President, W. J. Sutherland; vice-president, R. E. Wilson; secretary, C. E. Elliot; D. H. Jackson, superintendent, and the Nevada Bank, depository of funds. The financial statement submitted by the secretary was as follows:

RECEIPTS.

Bullion net proceeds		$163,816.09
Assessments, No. 11	$20,000.00	
On account, " 12 (rescinded)	7,954.25	
		$20,954.25
Buicksilver. Clean up of old mills		4,136.18
Supplies from last year		2,379.81
Mill: Castings and old iron sold		4,734.13
Mine: Sundry sales		1 740.77
On account, advertising, etc		172.50
J. H. Boatt. Bal. old account		9.15
H. M. Yerrington		1,250.00
J. Cross		625 00
Sundry supplies		262.25
Candelaria W. & M. Co. Bal. due		1,932.81
W. J. Sutherland. Advances to date		22,175.05
Outstanding draft		221.50
Overdraft, Nevada Bank		12,537.15
		$236,947.09

DISBURSEMENTS.

Mine expenses	$68,611.56
Mill expenses	44,004.04
Milling expenses	81,301.66
General expenses	6,036.97
S. F. office	1 938.89
Bullion: Selby & Co. in settlement of debts	2,442.57
" Freight on cars	1,962.84
Assaying: For refining	2,837.15
Taxes	970.09
Legal expenses	3,757.75
Supplies	3,531.26
Stable	1,095.34
Hauling	2,436.28
Assessment: Returned on account of rescinding	884.25
Property: Account land locations	500.00
D. H. Jackson: Account salary	1,500.00
Interest	1,040.30
Company stock	12.75
Leaching plant	42.69
C. Elliot	12
G. C. Holmes	268.00
M. Gerrard	22.25
Nevada Bank: Overdraft Feb. 31, 1890	9,260.86
D. H. Jackson: Balance Jan. 31, 1891	1,769.84
Cash: Balance	720.63
	$236.947.09

The total value of bars of bullion received to December 31st, 1890, was $181,675.23; on account, January, 1891, $9,144.01; fine silver purchased of Selby & Co., $2,442.57; total, $193,261.81. Loss and

discount, $22,445.72; net returns, $163,816.09. The amount of ore mined was 7,847, and 1,215 tons tailings averaging $6 were worked. The ore averaged $14.51 in July, the lowest for the year, and $32.02 in December, the highest. A short time ago, 75 tons of refuse ore taken from the waste dumps of the mine were treated by leaching as an experiment, with the most gratifying results. Eleven hundred ounces of sulphides were shipped to the Selby Smelting Works which netted $775 above all expenses. As there are about 400,000 tons of this ore on the dumps, and it costs only $3 to mine the ore and 15 cents to leach it, the margin for profit is sufficient to assure the paying of dividends when the leeching plant is increased—as it will be in the near future—to a capacity for treating 100 tons of ore per day.

EUREKA COUNTY.

RUBY & DUNDERBERG CONSOLIDATED MINING COMPANY.—At the annual meeting of the stockholders of this company the following were elected directors: Geo. W. Baker, M. B. Bartlett, John Pardy, W. J. Smith, and Alex Fraser. Afterward, at a meeting of the directors, Geo. W. Baker was elected president; M. B. Bartlett, vice-president; and James Wilson, treasurer and secretary.

STOREY COUNTY—COMSTOCK LODE.

(From our Special Correspondent.)

SAN FRANCISCO, Feb. 12.

The superintendents of the various bullion-producing mines have, with the exception of the Alta, filed in the assessor's office the reports of their operations for the quarter ending December 31st, 1890. The figures are herewith given:

MINE.	Tons of ore.	Bullion produced.	Cost of production.	Cost of production above yield.	Yield per ton.
Belcher	3,250	$45,741	$62,682	$16,941	$19.28
Con. Cal. & Va.	21,340	275,496	292,261	14,765	13.70
Chollar	6,765	84,520	110,470	25,950	16.33
Con. Imperial	1,135	15,041	42,160	27,617	13.25
Challenge Con.	125	1,643	15,718	14,075	13.15
Confidence	72	882	10,841	9,959	12.25
Crown Point	3,787	34,571	55,650	21,079	14.70
Justice	2,399	41,478	48,606	7,128	20.
Monte Cristo	358	2,498	3,132	724	8.74
Overman	5,150	68,110	74,458	6,348	14.46
Occidental	4,257	78,273	75,956	*	17.37
Savage	9,622	130,058	142,278	12,220	14.79
Yellow Jacket	4,849	64,218	90,102	35,885	18.60
	63,109	$842,439	$1,024,314	$182,375	

*The yield of the Occidental Consolidated Mining Company was $2.317 above cost of production.

It will be noted that the yield of bullion was $182,375 less than the cost of production. The net loss for the previous quarter was $152,392, so that for the latter half of 1890 the loss to the stockholders incurred by the bullion-producing mines of the Comstock aggregated $334,767.

Work of any kind carried on at such a loss must have a stopping point, and a return to deep mining and a general reduction in expenses are being presented to the stockholders as the alternative to a suspension of work. In either case they will be mulcted heavily in assessments, but in the former there is a possibility of their getting some money back; in the latter it is, at present outlook, a case of throwing good money after bad. The returns from Comstock Mines for the past year are as follows:

	Tons.	Average.	Bullion.
Alta Con	11,553	$10.20	$117,891
Belcher	6,650	16.36	108,711
Con. Cal. & Va	105,439	15.04	1,585,663
Chollar	21,981	14.07	309,354
Con. Imperial	2,432	14.18	34,491
Challenge Con	857	14 80	12,691
Confidence	300	14 36	4,310
Crown Point	29,056	11.84	343,958
Hale & Norcross	25,147	12.18	306,474
Justice	9,449	20.80	196,563
Monte Cristo	496	9.21	4,569
Overman	16 928	15.13	256,207
Occidental	4,257	17.37	78,273
Savage	27,515	14.13	389,017
Yellow Jacket	21,383	14.21	303,935
Total	283,443	$14.29	$4,052,107

There was a larger quantity of ore extracted during 1890 than for five years past; but the average grade was lower than for four years, and resulted in a large decrease in the bullion output, as these figures show:

	Tons.	Average.	Bullion.
Ore extracted 1885	228,004	$12.69	$2,895,249
" 1886	268,786	12.76	3,430,526
" 1887	282,300	15.80	4,462,417
" 1888	265 562	20.93	5,558,499
" 1889	279,985	18.00	5,024,664
" 1890	283,443	14.29	4,052,107

Although there were 3,450 tons of ore extracted during 1890 in excess of the previous year, owing to a decrease of $3.70 per ton in the grade the bullion product was nearly $1,000,000 loss.

The developments made in the Consolidated California & Virginia mine, where a body of $30 ore has been uncovered, but which is reported to average nearer $50 than $30, and the gratifyingly steady increase in the battery assays, bodes fairer, however, for the current year. An improvement may be noted in other of the returns from the following statement of ore milled during the week ended Saturday, February 7th:

	Tons.	Assay value.
Con. Cal. & Virginia	1,575	$22.50
Chollar	542	16.05
Justice	153	17.07
Overman	387	14.75
Savage	530	14.80
Yellow Jacket	300	18.00

The arrangements alluded to in previous issues of the ENGINEERING AND MINING JOURNAL as pending between the Comstock Tunnel Company and the several mining corporations have resulted in an agreement, by virtue of which a lower rate of royalty will be charged henceforward. The old rate of $1 per ton on ores assaying below $40, and proportionately higher figures on ores above that value, will be charged on all ore extracted previous to November 1st, 1890. The companies were in arrears $175,000, of which $116,000 was charged to the Consolidated California & Virginia; $100,000 of this amount has been paid, however, leaving a balance still due of $16,000. The remaining $59,000 is owed jointly by the Belcher, Crown Point, Chollar, Hale and Norcross, Savage and Yellow Jacket companies. Under the new agreement back royalties due prior to November 1st will be paid at the old rate, without interest, and from that date the royalty will be 4% upon the gold value of the bullion yield, with the proviso that in no event is the change to exceed $2 per ton. This is the first in the series of reductions to be made in the expenses of the Comstock mines, and it is expected that considerable low-grade ore which heretofore has not been handled will now be worked at a profit. The directors of the several mining companies will meet next Monday for the purpose of signing the above agreement.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—On the 1,600-foot level, at a point 200 feet south from the northline of the California ground and 44 feet above the sill floor of the level, the ore has widened and has improved in grade. It is officially stated that it will average $33.50 per ton, but private advices say that it assays much nearer $50. During the month of January the ore worked for account of the company amounted to 6,855 tons, which yielded bullion of the assay value of $99,393.56, of which $48,475.42 was gold and $50,918.14 was silver. The average yield in bullion per ton was $15.84, and the assay value of the battery samples was $19.34 per ton.

CROWN POINT MINING COMPANY.—Little progress was made in lowering the water last week, on account of the dammed-up water in the caved stopes on the 1,600 level breaking loose and flooding the incline. More than once the men were driven from the bottom, thereby delaying the work of retimbering the shaft. After the stopes on this level have been passed and thoroughly drained it can be reasonably expected that good headway will be made in going down to the 1,700-foot level, as the shaft appears to be in better condition than it was below the 1,500-foot level. The surface of the water is now four feet below the 1,600-foot level.

NEW MEXICO.

DONA ANA COUNTY.

MODOC.—An important strike of lead ore is reported to have been made in the Modoc mine, in the Organ Mountains, at a depth of about 100 feet. The lode is said to be four feet wide, and the ore runs very high in lead, besides carrying some silver. Heretofore the Bennett and Stephenson mines have been the only important lead-producing mines in the mountains.

GRANT COUNTY.

OTHELLO AND DESDEMONA.—It is reported that W. E. McDaniel, who is driving a tunnel in these mines at Cook's Peak, has struck a cave, which is an immense depository of lead carbonate. The point where he broke into the cave is 520 feet from the mouth of the tunnel. He has made thorough exploration, by crawling over the entire body, the space between it and the roof being but about two feet. He finds that it is about 75 feet long and about 25 feet wide; around the edges where the ore body is settled away from the wall, he has measured it to the depth of 30 feet.

LINCOLN COUNTY.

OLD ABE.—Recent developments in this mine at White Oaks indicate that it will become an important gold producer. A crosscut from the shaft to the vein, at a depth of 105 feet, shows the body of ore to be continuous to that depth, and that the ore is as rich there as in the drifts on the first level. The mine has produced about $13,000 worth of ore since the middle of December, with only one level from which to take ore. Four mills are now running at White Oaks, and ore is slowly accumulating there.

SANTA FE COUNTY.

(From an Occasional Correspondent.)

SANTA FE COPPER COMPANY.—After deliberating 18 months this company has erected a concentrating mill of 75 tons capacity to make use of the large amount of low-grade ores of the San Pedro copper mines. The money to buy the machinery was advanced by a New York metal house, assisted by some of its Boston friends, all belonging to the board of directors. The company will have to pay these parties $250 per month for the lease of this mill until such time as it may be able to buy the machinery outright, at cost price. The intention is to begin at once smelting these concentrates and the high-grade ore together, and become a producer again. The proceeds should go first toward repaying advances made by some of the directors. At a recent meeting the principal holders of the first mortgage which is on all properties of the company and its improvements, consented to waive payment of the two unpaid coupons until these recent advances have been repaid. While this action does not prejudice the legal claims of the smaller holders of such mortgages, the amount due them, being comparatively small, may be settled by paying the coupons which they hold. In this way the company will very soon be working on a sound basis, though it will probably find the capacity of the present concentrating mill too small. The low-grade ores are of such quality that it will take between four and five tons of ore to make one ton of concentrate, and the yield per day will hardly exceed 15 tons of concentrates, consisting chiefly of nearly pure copper pyrites. The company may find it to its advantage to increase the capacity of the mill.

NORTH CAROLINIA.

CHEROKEE COUNTY.

Col. Henry E. Colton is said to have shipped a lot of nickel ore from Murphy, via the Marietta and North Georgia railroad, to some metallurgical works in the vicinity of New York City. This ore is the silicate, carbonate and oxide of nickel. At the same time a large quantity of chrome ore was sent to Baltimore to be worked into bi-chromate of potash and other chromate salts. These shipments were made with a view to ascertaining the practicability of continued production.

PENNSYLVANIA.

COAL.

It is reported that Messrs. Bell, Lewis & Yates, the large coal operators of the Reynoldsville District, in Jefferson County, will put in an electric plant at their collieries. The change is made so as to guard against explosion from gases or firedamp.

The transfers of coal lands in the Monongahela Valley continue quite as numerous as lately. Near Monongahela City the coal under the farms of Kate and Hannah Manown, Mrs. James Finney, Wilson Hall and John Applegate, all in Forward Township, Allegheny County, and comprising a block of 500 acres, has just been transferred to Harry Brown. The price per acre ranges from $150 down to $85, averaging about $125. Very little more coal is left in that vicinity belonging to the farmers. The Gamble, Blaine and Wycoff tracts are still on the market, but it is expected that they will soon be sold. Further up the river, at California, Jordon S. Neel, the well-known Fourth pool operator, has just bought the Lilley tract of coal, 200 acres at $125 per acre. He will at once open the coal for rail shipments, and the mine will employ about 200 miners in addition to those now already at work. Just near the same tract, Carothers, Gregg & Co. have secured the coal under the Shutterly, W. W. Jackman, James and John McCrory farms, almost 250 acres, at $125 per acre. This firm will also open a new mine just above the Normal College, and will employ about 200 men.

The bill authorizing the governor to appoint a commission to revise the mining laws and to inquire into the condition of the various mines passed the House in the State legislature without a dissenting vote. The coal operators of Pittsburg are worked up over the bill to compel them to pay one cent on every ton of coal mined, to create a fund for the support and maintenance of miners maimed in the coal pits and the burial of those who may be killed. The operators say that the State has no right to organize an accident insurance system for one class of workmen and tax another class to maintain it.

Statistics reported by the Mine Inspectors show 118,977 people employed in the anthracite mines in 1889, of whom 385 were killed while at work, as against 151 operators and companies owning mines. In the bituminous regions the disparity is not so great, the workmen numbering 61,344 as against 388 individual operators and companies. The loss of life, too, was only 99 in the soft coal region. This shows a grand total of 180,321 workmen, 549 operators and companies and 484 persons killed while at work.

HILL FARM.—The litigation growing out of the thirty deaths caused by the explosion in this mine last June was ended at Uniontown on the 17th inst. The damage suits brought by the widows and heirs of the victims against the Dunbar Furnace Company were compromised, the company agreeing to pay $500 to each widow and $60 to each child left fatherless. There are in all about twenty widows and fifty children, and the aggregate amount is $12,575 and a house and lot.

KINGSTON COAL COMPANY.—During 1890 this company worked 173 days and employed 1,915 persons. Of twenty-five casualties there were eighteen that did not prove fatal. The total amount of coal produced was 780,118 tons.

THE MAYER MINE.—This mine, owned by W. J. Rainey, was discovered to be on fire on the afternoon of the 16th inst. Mouse creek was turned from its course into the shaft and large quantities of water ran thus into the workings. Fifty miners were at work at the time of the explosion. Fourteen in all perished. No effort could be made to save them at the time, as the fire destroyed the air fan. On the 17th inst. the fire was extinguished, but

the air was so stifling that several days will have to elapse before the full extent of the disaster is known. Three months, it is reported, will be required to pump out the water, but work will be resumed in many parts during next week. Messrs. W. J. Rainey & Co., consider that the fire had an incendiary origin and suspicion is directed towards the pumpman. Previous to the conflagration a great deal of difficulty had been experienced with striking laborers and miners.

YOUGHIOGHENY RIVER COAL COMPANY.—This company has purchased two large tracks of land in Elizabeth township from Charles H. Strong, of Erie, a son-in-law of Hon. W. L. Scott. The two tracts contain more than 2,800 acres and the price paid is reported to have been $300,729.78. The Mathews track comprises 1,609 acres, the Howell track 1,217 acres. In the latter the company only secured a $\frac{39}{40}$ interest, the other fortieth being held by a person who refused to sell. The land has not been developed yet, but operations will be commenced at once. The coal will likely be shipped by rail, though the company may have a river tipple. The company recently made other large purchases in the Monongahela and Youghiogheny valleys.

OIL.

The Chief of the Bureau of Statistics reports the total values of the exports of mineral oils from the United States for the month of January, 1891, and during the seven months ending January 31st, 1891, as compared with similar exports during the corresponding periods of the preceding year, as follows: January, 1891, $3,312,225; January, 1890, $3,090,067; seven months ending January 31st, 1891, $33,324,491; seven months ending January 31st, 1890, $32,295,963.

SOUTH DAKOTA.

LAWRENCE COUNTY.

An experimental plant, it is said, will be erected inside of the next 60 days in Bear Gulch by Clark Stratton and associates. The gentlemen own some valuable properties which are sufficiently well developed to satisfy competent judges as to their merit. The plant to be erected will have a capacity of 50 tons per day, will be equipped with a Gates crusher, and will treat the ores from these claims. The engine and boiler to furnish the necessary power are reported to have already been purchased.

The report has been going the rounds of the local press that Col. O. O. Taylor, of St. Paul, who has acquired title to a number of valuable Nigger Hill tin claims, has decided to erect a mill and concentrator, and has already purchased a portion and contracted for the remainder. The Colonel owns a mill site, with water right and plenty of good timber.

CALEDONIA GOLD MINING COMPANY.- At a recent meeting of the Board of Directors of this company the following officers were elected: W. F. Goad, president; Geo. R. Wells, vice-president; J. B. Haggin, treasurer; Thos. J. Grier, superintendent. As already announced in these pages, the mine was sold to the Homestake Mining Company and the new directory represents the purchasers.

DEADWOOD AND DELAWARE SMELTING COMPANY.—About 100 tons of $25 ore, enough for a six days' run, are reported as still on the dump at the company's little smelter. It is expected that so soon as sufficient quantity of coke can be received from Newcastle, this will be put through, more for the purpose of testing the value of the Newcastle article as a fuel than for any other. The plant was therefore expected to blow in during the past week.

GOLDEN REWARD CHLORINATION WORKS.—A new four-ton barrel for these works is reported to have been recently ordered in Chicago. It is expected in Deadwood about March 20th, and will increase the capacity of the works to 70 tons per day.

STAR.—The new shaft and drums at the hoisting works of this mine, it is said, will be in place in a week or 10 days. The drums are conical, the largest diameter being seven feet six inches, with the other end one foot and six inches smaller. While this change is being made ore and men are hoisted at the Vertical and Old Abe shafts. At the Old Abe a great deal of ore is being hoisted—from 800 to 1,000 tons a day. Another compartment is now being made to the shaft, thus making four. The new one, which was commenced at the bottom and worked upward, is within 36 feet of surface, and when finished is to be used for hoisting ore, as are two of the others. The big pump, which is considered the largest in the Hills, is making three strokes a minute. There is not the usual amount of water; the mines, as the pump is worked only about 12 hours a day and the water is being raised from the 700-foot level.

(From our Special Correspondent.)

LEAD CITY, Feb. 14.

The belt mines are all doing well. Every mill of the Homestake, Highland, Deadwood, Luna and Caledonia companies is running. Things are being made ready to build the new smelter, and new Leaching works are going up for the Ruby Basin & Bald Mountain ores. The two railroads, the F. E. & M. V. and the B. & M., are now into Deadwood, and the mining industries of the country particularly are very active.

TENNESSEE.

MARION COUNTY.

ETNA COAL AND MINING COMPANY, Chattanooga, Tenn., located at Whiteside, has made an assignment. The liabilities are estimated at $100,000, and the assets at $300,000. Labor troubles and slow collections are given as the cause of embarrassment. Dr. William Morrow, a leading capitalist of Nashville, is the president of the company.

UTAH.

BEAVER COUNTY.

HORN SILVER MINING COMPANY.—The ore which has been shipped by this company during the past two months has been copper. Some of it carries as much as 29% of this metal, with 8 or 10 ounces silver. The company has not been shipping any of its silver ore, and has had at the mine stored in the bins, in cars and in the mine some $50,000 or $60,000 worth, waiting a demand for it. There is said to be a large body of copper ore opened in the mine, and most of the work being done now is in that portion of the property. One lot of 1,200 tons of lead ore was sold last week, bringing a good price.

JUAB COUNTY.

The large deposits of red ochre at Nephi, owned by George O. Streeter, of Ogden, are to be developed, and a plant for the manufacture of paint is to be erected during the coming summer. The quality of the paint made from it is said to be very good.

SALT LAKE COUNTY.

FLAGSTAFF MINING COMPANY, LIMITED.—An official report from this company states that a good body of ore has been opened in the southeast drift. It is seven feet in width and extends both upward and downward. Its grade is good and improving, and the ore body is leading into promising ground. A force of 14 men is being employed in the mine, work being prosecuted in the sixth and seventh levels. A weekly production of about 70 tons of ore is being made.

TOOELE COUNTY.

BUCKHORN.—It is reported that this mine, owned by the Representative Niedringhaus and associates of St. Louis, has been sold to an English syndicate for $125,000. The estimated ore reserves in the mine are reported to be quite large, and it is likely that the property will be operated with activity during the coming summer.

VIRGINIA.

WISE COUNTY.

The vein of coal opened by Leisenring, at Big Stone Gap, shows in the gangway nearly six feet clean coal and a vein over it between seven and eight feet. An analysis of the coke made in an experimental oven (by McCreath) is said to have been as follows: Water, ·068; volatile matter, ·564; fixed carbon, 94·040; ash, 4·740; sulphur, ·588. Color of ash, brown.

VIRGINIA TIN MINING COMPANY.—According to reports this company has been organized with a capital of $10,000,000 to work tin deposits which some years ago were discovered by Captain Sales, a prospector of Capron Springs, while prospecting in the Blue Ridge. He purchased some of the mountain land containing the ore. Ten barrels of the latter were then shipped from Boyce Station, on the Shenandoah Valley R. R., to parts unknown. The discovery provoked considerable comment at the time, and, according to general belief, the ore was shipped to England for the purpose of comparing it with the tin ore of Cornwall. Recently a large extent of land in the neighborhood of this discovery was disposed of under a trustee sale, bringing the usual price paid for mountain land, and people were surprised to find that the purchaser represented Capt. Sales. After securing this big tract of land it is now announced that the above company has been incorporated, with Capt. Sales as president, and several well-known men of Winchester and Baltimore as directors. The capital stock, it is said, has all been subscribed, and the work of developing the mines will soon begin. Big smelting works are to be erected, the owners believing that they have found probably the richest deposit of tin in the United States. The mines lie on the western slope of Blue Ridge, a few miles north of Ashley's Gap, and about 60 miles southwest of Washington. (See ENGINEERING AND MINING JOURNAL of November 7th, 1885, for an illustrated article on "Tin Ore in Virginia.")

WASHINGTON.

KITTITASS COUNTY.

The iron, lime and coal resources of this county are exciting a good deal of local interest at present, and, according to report, experiments are under way to determine the feasibility of establishing an iron plant in the vicinity of Ellensburg. It is furthermore said that a fine quality of car-wheel iron has already been turned out, which makes the establishment of car-making industries so much the more probable. In addition to the large land subsidy already subscribed to secure manufactures in Ellensburg, 125 acres have been donated as a site for a proposed iron plant.

LINCOLN COUNTY.

PIOCHE CONSOLIDATED MINING AND REDUCTION COMPANY.—A new ore body was discovered about a month ago in the Day mine, which has developed, it is said, into one of considerable importance. The strike was made above the old working tunnel level on the west side of it, and about 700 feet from its mouth. The ore has already been drifted on for a distance of 75 feet and raised in for the same distance. The walls of the vein range from 4 to 18 feet apart, and will average 10 feet. The ore differs both in appearance and analysis from the average ore of the mine, containing 8% to 10% silica, and will average 40 ounces in silver per ton as broken down with no sorting. Picked samples range from 60 ounces to 600 ounces per ton in silver. In the tunnel which is being driven west of the main working tunnel and parallel with it, good ore was struck recently. In character it strongly resembles that of the new strike, the vein being as wide as three feet, with an average of 12 inches. The ore here assays about 35 ounces silver per ton. This tunnel is running toward the new strike and will pass under it, but is yet 500 feet distant. See the ENGINEERING AND MINING JOURNAL of the 7th inst. for "The Ore Deposits of Pioche."

OKANOGAN COUNTY.

IVANHOE.—It is expected that the present year will see a large amount of development work on this group of mines. The necessary buildings, such as ore sheds, shaft houses, boarding and bunk houses for the miners and other employés, are at present under construction. Mr. Ballard has the contract for patenting the group, and will commence his survey in a few days. Mr. Westren, one of the owners, before returning from the East, where he has been spending the winter, will purchase all the necessary machinery in Chicago, and should present expectations be realized it is not improbable that some mill for treating the Ivanhoe ores may be erected near the mine during the summer.

YAKIMA COUNTY.

E. K. Curr, who is mining and prospecting in the Natchez district, is reported to have brought to North Yakima recently specimens of stone with alternating stripes of black and brown that he took to be petrified wood. Experts pronounced the stone onyx, such as is used for cameos. The specimens of the Yakima onyx have been sent by Messrs. Thomas & Son to Price, of San Francisco, with instructions to pass upon the character of the onyx and then turn them over to a lapidary for cutting. The stone takes a high polish, and is very handsome.

WEST VIRGINIA.

SUMMERS COUNTY.

A vein of coal, six feet thick, is reported to have been found at Meadow Creek, and openings have been made into it for the purpose of mining it for shipment via the Chesapeake and Ohio Railway. It is the nearest coal to tide-water on that road, and it is expected to cut quite an important part in the coal industry of that section.

WISCONSIN.

DOUGLAS COUNTY.

Work was commenced during the past week on the construction of the plant of the new smelting works which will be built in Superior by a St. Louis stock company. It is reported that the cost of the plant when completed will be $150,000 and several hundred men will be employed.

FOREIGN MINING NEWS.

NOVA SCOTIA.

(From Our Special Correspondent.)

COAL.

During the past year the sales of coal, from the best sources of information available, amounted to 1,750,000 tons, against 1,555,107 tons in the previous year. The shipments up the St. Lawrence show an increase of over 125,000 tons over last year, and the balance of the increased output is divided among the home markets, and the maritime provinces. A temporary scarcity of gas coals brought the sales to the United States up to 50,000 tons, a large proportion of which was slack coal. At the Cape Breton mines coal is being banked out in readiness for the opening of navigation, and a large trade is anticipated. It is reported that the Gowrie mines, at Cow Bay, have secured a Grand Trunk contract for nearly 100,000 tons. In the Pictou region the local markets keep the mines fairly employed, and in Cumberland county the Inter-Colonial Railway equipment is to be increased to meet the requirements of the Spring Hill collieries. The question of reciprocity in coal is securing some attention in the Dominion election campaign, but it appears to be generally conceded that any extension of sales in the New England states, in the face of opposition from the United States coal trade, would not equal the present opening along the St. Lawrence, and that a higher duty would greatly extend the market for the Lower Province coal.

IRON.

The Londonderry Iron Works have passed a fairly prosperous year, and have developed at Pugwash, Pictou, Brookfield, and Niclaux valuable and important ore bodies as a reserve to their own mines. The New Glasgow Iron and Railway Company have secured the promise of a subsidy from the local government, and have commenced the construction of the branch railway to the East River Iron Ores.

GOLD.

From such returns as are available the total yield of gold last year was about 21,000 ounces, a decrease of about 5,000 ounces as compared with the yield of 1889. The causes of this may be explained by too hasty development, and the premature absorption of profits to pay the largest possible dividends. The working of low-grade ores has been steadily carried on, and year by year the returns from this class shows an increase. Sherbrooke, Moose River, Salmon River and Waverley may be mentioned among the localities where such ore is worked. The Brookfield conglomerate boom is quieter now. The Coldstream Company will make mill tests of a few hundred tons of it, and, if the results prove satisfactory, will proceed with the enlargement of its mill. The Salmon River Company have completed a new battery plant capable of handling nearly 2,000 tons a month, and will start at once. In Queens County there is little new, and it is reported that some of the more prominent mines will close down.

MEETINGS.

Denver Natural Gas and Oil Company, at Room 1, No. 1,540 Lawrence street, Denver, Colo., March 10, at 2 P. M.

Emmons Mining Company, at Room 44, Jacobson Building, Denver, Colo., March 2d, at 4 P. M.

St. Joseph Lead Company, at No. 55 Liberty street, New York City, February 25th, at 12 o'clock noon.

DIVIDENDS.

American Coal Company, dividend of three per cent., payable March 10 at the office of the company, No. 1 Broadway, New York. Transfer books close February 27th and reopen March 11th.

Aurora Iron Mining Company, dividend of $1 per share, payable at the office of the company, Perry-Paine Building, Cleveland, O. Transfer books close February 20th and reopen March 2d.

Daly Mining Company, dividend No. 48 of 25 cents per share, $37,500 payable February 28th at the office of Messrs. Lounsbery & Co., Mills Building, New York City. Transfer books close February 23d, and re-open March 1st.

Homestake Mining Company, dividend No. 151 of 10 cents per share ($12,000), payable February 25th, at the office of Messrs. Lounsbery & Co., Mills Building, New York. Transfer books close February 20th and reopen February 26th.

Ontario Silver Mining Company, dividend No. 177 of 50 cents per share, $75,000 payable February 28th at the office of Messrs. Lounsbey & Co., Mills Building, New York City. Transfer books close February 24th, and re-open March 1st.

ASSESSMENTS.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of sale.	Amn't per share.
Alliance, Utah	11	Jan. 5	Feb. 7	Mar. 2	.10
Atlantic, Con. Nev.	7	Nov. 19	Mar. 2	Mar. 21	.25
Brunswick Con., Cal	1	Jan. 8	Feb. 10	Mar. 6	.02
Challenge, Nev.	8	Jan. 26	Feb. 27	Mar. 18	.50
Con. St. Gothard, Cal	2	Feb. 12	Mar. 31	Apr. 20	.15
Del Monte, Cal.	4	Jan. 5	Feb. 9	Mar. 3	.20
Gould & Curry, Nev.	66	Feb. 3	Mar. 11	Apr. 7	.30
Hale & Nor., Nev.	97	Jan. 7	Feb. 11	Mar. 4	.50
Head Center	2	Jan. 19	Feb. 19	Mar. 25	.05
Iron Hill, S. Dak.	19	Jan. 9	Feb. 11	Feb. 28	.35
Idlewild, Cal	1	Jan. 29	Mar. 2	Mar. 21	.10
Kentuck, Nev.	..	Dec. 29	Feb. 3	Feb. 25	.05
Lone Star Con., Cal.	2	Dec. 29	Feb. 7	Mar. 2	.00½
Midas, Cal	1	Jan. 13	Feb. 23	Mar. 23	.20
Milwaukee, Mont.	..	Jan. 22	Feb. 20	Mar. 12	.00½
N. Gould & Curry, Nev.	12	Jan. 10	Feb. 11	Feb. 28	.20
Sierra Nev., Nev.	98	Jan. 2	Feb. 5	Feb. 24	.30
Union Con., Nev.	42	Jan. 5	Jan. 10	Mar. 2	.25

MINING STOCKS.

For complete quotations of shares listed in New York, Boston, Salt Lake City, San Francisco, Baltimore, Denver, Kansas City, Minneapolis, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 251 and 252.

NEW YORK, Friday Evening, Feb. 20.

The mining stock market is simply stagnant. The promise which was presented two weeks ago has been dispelled, leaving nothing but dullness in its place. It is simply too dead to respond to transactions. We are compelled to chronicle a less number of sales than have taken place in many weeks. They aggregate 28,600, as compared with 43,053 of the week previous and 136,865 of the corresponding week last year. Of this number 8,068 were of dividend shares. The Comstocks were the only feature of the market. They fluctuated so wildly in values as to bar any but a speculative element from investing. As compared with the week previous they lost ground. Values of other shares with few exceptions underwent a decline. Adverse conditions which have been mentioned so many times in this column are held responsible for the state of affairs. The prospects for the coming week are not bright.

Of the Comstocks, Alta sold 600 shares at 70c.@ 80c., closing at the former figure. Andes was in the market for the first time in several weeks. It opened on Monday at $20, rising to and closing at $2.30 on Tuesday; 300 shares changed hands. Chollar opened the week at $2.15, a drop of 25c., rallied to and closed at $2.35 on Thursday; sales were very light. Comstock was dealt in to the extent of 200 shares at 16c. This is about the averaged price that has been maintained some weeks past. Two thousand shares of Comstock Bonds sold at 35c., an advance of 5c. over recent quotations. Julia sold 1,000 shares at 27c. Mexican was in good demand, but holders asked too much for their shares. The quotations ranged from $2.50 to $2.70, closing at $2.60; sales were very light. Occidental to the number of 200 shares changed hands at 90c. Scorpion maintained its price of the previous week, or 30c. on sales of 300 shares. Seg. Belcher sold 200 shares at $2 20. This is a drop of 10c. Crown Point opened the week at $1.90, the closing price of two weeks ago, dropped to and closed at $1.75 on sales of 600 shares. Gould & Curry opened at $2.10, a loss of 30c. contrasted with closing price of the previous week. It rose to and closed at $2.35; sales amounted to 200 shares. Hale & Norcross sold 100 shares at $2.25, a gain of 25c. Savage sold 100 shares at $2 25, a gain of 25c. Sierra Nevada sold 200 shares at $2.30, last week's quotation. Yellow Jacket is in the market to the extent of 600 shares; it opened on Saturday at $2.35, rose to $2.45 on Tuesday, declined to and closed at $2.25 on Thursday. This was a falling off of 30c. over last week's prices. Best & Belcher, after a week's absence from the exchange, was called on Tuesday at $2.25, a loss of 45c. It rallied to and closed at $2.60. Sales were very light. Utah opened at 80c., a gain of 10c. over last week's quotation, declined to 70c. on Tuesday and regained its opening price on sale of 270 shares. The only copper stock dealt in was Tamarack. Transactions of 10 shares at $140 are noted.

Of the Colorado stocks Aspen sold 150 shares at $6.25.

Leadville Consolidated opened the week at 12c., dropped to and closed at 11c. Little Chief experienced very light sales at 34c.

Brunswick was active as usual. It opened the week at 15c., steadily dropped and closed to day at 11c.; sales of 3,300 shares are reported.

Of the Amadors, Belmont experienced a week of inactivity. The ruling price was 35c. Middle Bar maintained its usual quotation of 4c.

Bodie Consolidated sold 200 shares at $1.35.

Advices from the Standard state that a streak of rich rock 31 inches wide has been struck in the V crosscut at the 400-foot level, and that it has the appearance of being a good body of ore. The stock was not quoted during the week.

El Cristo opened the week at 50c., declining to and closing at 39c. Sales were moderate.

Mutual Smelting & Mining had a comparatively active week, and was quite generally called for. The ruling price was $1.50; 1,400 shares changed hands.

Phœnix of Arizona was the most active stock in the week. It opened on Saturday at 60c., declined to 50c., rose to and closed at 57c.; sales aggregated 2,800 shares.

Horn Silver developed considerable strength. It opened the week at $3.15, which was also its closing price; sales of 800 shares are to be recorded.

Of the other stocks we note the following transactions: Caledonia sold 100 shares at 65c.; Holyoke, 100 shares at 3c.; Colorado & Beaver 100 shares at 3c.

Boston.

Feb. 19.

(From our Special Correspondent.)

There is very little change to note in the market for copper stocks the past week. Transactions have been light generally, and there seems to be no indication of a revival of activity in the near future. The unsettled state of the market for ingot copper is not calculated to inspire confidence in prices, and the attention of operators is diverted to other channels which offer better inducements for profits. The copper stocks have always been favorites in this market, and it will not take much to turn the tide of speculation back to them whenever the conditions are such as to warrant an upward movement.

The dealings in Allouez have been quite large on account of the recent fire at the mine, which entails delay in production and some loss, and, as usual in such cases, a good deal of stock was put on the market by frightened holders, causing a decline in price from $3.25 to $2.50. The market, however, took all the stock offered, and it closes firm at $2.50 bid. Over 5,000 shares changed hands. Next in point of activity was Santa Fe, which took a slight upward spurt from 55 to 62½c., but it did not hold the advance and reacted to the opening price. Sales were 4,600 shares.

Boston & Montana has been quiet and quite steady in price, with $41@$42 as the extremes. It closed at $41½. Butte & Boston sold up to $16.50, but lost the advance in the later dealings. Centennial declined to $15.50, a loss of $1.50 for the week.

Kearsarge developed considerable weakness, and on forced sales declined to $11.25, recovering to $12. Osceola declined to $36.50, as against $37.50, the highest point for the week. Quincy advanced to $95 on sale of 100 shares, with subsequent sales of small lot at $91.50.

Franklin dull but steady at $17@$17½.

Calumet & Hecla, and also Tamarack, unchanged. There were sales of the former at $2.60, and of the latter at $1.45.

Atlantic declined ½ to $15.

Bonanza sold at 62½c.; National at $3.50, and the balance of the list was neglected.

There is nothing doing in the silver stocks.

By Telegraph.—Calumet and Hecla, $256; Quincy, $95; Boston and Montana, $41¾; Osceola, $36½ bid; Butte and Boston, $15½; Franklin, $17 bid; Allouez, $2½.

San Francisco.

Feb. 12.

(From our Special Correspondent.)

Trading has been moderately active during the week, but prices have continued to decline in a persistently suspicious manner. No unfavorable news has been received from ore mines to counteract the hopeful feeling engendered by the reports current regarding ore developments in several of the properties, and which have received official sanction.

A week ago Consolidated California and Virginia sold for $5.25, and each day since then has steadily declined, till yesterday it sold for $4.40—this, too, in the face of the ore body of high grade uncovered on the 1650 level and the average assay value of the ore extracted during the last week ranging as high as $22.50.

Most of the other north end stocks have also declined heavily, but as their intrinsic merit—with the exception of Ophir—is small their price is regulated by the bonanza stock.

In the middle group Hale & Norcross, without any apparent warrant, advanced last Saturday to $2.05, an increase over the previous day's prices of 45 cents. Since then it has sold steadily at $1.95, with moderate sales. Potosi a week ago sold for $5.25, and has declined during the interval until yesterday, when the ruling price was $4.95. This morning no sales at all were made.

The south end stocks have, with the exception of the low-priced ones, kept pace with the remainder of the Comstocks in the decline. Bullion lost 45 cents during the week; Overman 20 cents, and the remainder in like proportion.

The one feature of the week's trading has been a little deal in Bodie Consolidated which a week ago (Thursday) advanced from 90 cents to $1.05, rose to $1.70 on Monday, and touched the 90 cents figure again yesterday, the ruling rate, however, being $1.00.

The Tuscaroras have been fairly steady, but little in demand.

There is no support to the market just now and consequently it is responsive to the shorting operations of the chippers and small brokers who are content to gather in the difference in selling prices between the Pacific and San Francisco Stock Boards. That they have not been altogether idle may be seen by the following week's sale:

Thursday February 5th, 22,240; Friday, February 6th, 13,540; Saturday, February 7th, 10,910; Monday, February 9th, 19,800; Tuesday, February 10th, 18,565; Wednesday, February 11th, 13,875. Total, 98,930.

Lake Superior Mining Stocks.

(Special Report by A. M. Helmer, Milwaukee, Wis.)

Ashland	$60.00	Cambria	.....
Aurora	10.00	Jackson	$110.00
Anvil	3.00	Lake Superior	70.00
Brotherton	2.50	Milwaukee Iron Co.	5.00
Germania	10.50	East New York	2.00
Gogebic Iron Syndicate	35	Pittsburg & Lake Angeline	155.00
Ironton	....	Republic	28.00
Montreal	12.50	Chandler	38.00
Metropolitan	67.50	Chicago & Minnesota Ore Co.	114.00
Northern Chief	35.00	Minnesota Iron Co.	76.00
Odanah	15.00	Pence	.....
Pence	2.00	Miscellaneous:	
Pence & Snider	60	Ropes Gold and Silver Mining Co.	1.50
Ruby	....	Ryan	25
Michigan Gold Mining Co	40	Sec. 33	20.00
Champion	80.00	"Badger" Silver M. Co.	5.00
Cleveland	18.50		

PIPE LINE CERTIFICATES.

(Specially reported by Messrs. WATSON & GIBSON.)

There has been nothing of moment in the oil market to record during the past week. So dull has the market been that on Saturday of last week there was not a single barrel of oil traded in. Under such a condition the public can hardly be expected to take any interest in the market.

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 14	79½	79½	79½	79½	10,000
16	79	79	79	79	3,000
17	78	78	78	78	5,000
18	....	....	....	....	.....
19	....	....	....	....	.....
20	....	....	....	....	.....
Total sales in barrels					18,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 14	....	....	....	....	.....
16	80	80	79½	79½	55,000
17	79¼	79½	78¼	78¼	81,000
18	78⅛	78⅛	77	77½	23,000
19	77⅞	77⅞	76¾	76⅞	54,000
20	76	77¼	75¼	76⅛	71,000
Total sales in barrels					284,000

Electric Stocks.

According to reports, Mr. George Westinghouse stated as follows regarding the consolidation with the Thomson-Houston Company and the Westinghouse Electric Company: "The only understanding that exists between us and the Thomson-Houston people is as far as relates to certain patents in which we are mutually interested. There will not be any consolidation of interests of the two companies other than a working agreement having reference to the joint use of certain patents." According to a statement prepared for publication by Mr. Westinghouse, he reported to the Board on the 16th that about 37,000 shares had been taken and that "parties in the East had guaranteed to take 5,000 shares in addition, with the expectation that from 5,000 to 10,000 more would be placed." The time for receiving subscriptions was extended to the last day of the month. This statement also declares Mr. Westinghouse's confidence in placing the entire 60,000 shares of the preferred stock in the near future, and that the common stock that will be returned to the company in payment for preferred stock will be very limited. Most of the preferred stock, it is said, is being taken at par.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 20.

STATEMENT of shipments of anthracite coal (approximated) for the ten days ending February 14th, 1891, compared with corresponding period last year:

Regions.	Feb. 14, 1891.	Feb. 15, 1890.	Difference.	
Wyoming Region. Tons	346,455	261,907	Inc.	84,548
Lehigh Region "	109,441	88,437	Inc.	21,004
Schuylkill Region "	195,697	114,275	Inc.	81,422
Total..... Tons	651,593	464.619	Inc.	186,974
Total for year to date Tons	4,379,105	3,395,048	Inc.	984,057

STATEMENT of anthracite coal shipments for the month of January, 1891, compared with the corresponding period last year. Compiled from returns furnished by line operators.

	January, 1891.	January, 1890.	Difference.	
Wyoming Region	1,684,307.05	1,081,253.10	Inc.	603,053 95
Lehigh Region	686,845.08	499,421 12	Inc.	12,576.04
Schuylkill Region	955,232.07	713,479.19	Inc	241,752.88
Total	3,138,961.04	2,281,57[illegible].17	Inc.	857,382.07

The stock of coal at tidewater shipping points, January 31, 1891, was 637,668 tons; on December 31, 1890. 535,-65[illegible] tons; increase, 102,016 tons.

PRODUCTION OF BITUMINOUS COAL for week ending February 14th and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

	1891. Week.	1891. Year.	1890. Year.
Phila. & Erie R.R.	2,506	21,274	19,308
Cumberland, Md.	†35,598	459 952	538,209
Barclay, Pa.	*3,285	20,256	15.130
Broad Top, Pa.	15,009	84,487	75,407
Clearfield, Pa.	82,885	585,161	567,328
Allegheny, Pa.	27,107	168,232	145,702
Beach Creek, Pa.	*45,868	512,238	236,420
Pocahontas Flat Top	43,906	264,251	243,464
Kanawha, W. Va.	†46,671	223,431	265,911
Total	352,322	2,130,282	2,106,939

* Estimated.
† Week ending January 31st.

WESTERN SHIPMENTS.

Pittsburg, Pa.	19,226	146,982	115,743
Westmoreland, Pa.	37,536	261,015	241.254
Monongahela, Pa.	7.861	74,584	34,294
Total	64,623	482,581	391,291
Grand total	416,945	2,612,863	2,498,230

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending February 14th, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 57,469 tons; year, 576,431 tons; to corresponding date in 1890—761,927.

Anthracite.

The press of the country is just commencing to recognize the situation in the trade that has been apparent for the past three weeks to the reader of these columns. The ENGINEERING AND MINING JOURNAL, on January 24th, in summing up the anthracite coal situation, stated that the companies were jeopardizing their interests by exceeding their percentage outputs, and predicted demoralization in trade circles if they did not adhere to prescribed figures. At a meeting held on the 12th inst. it was shown that these companies, instead of curtailing, had continued their excesses. This gave rise to a general discussion of the laws of supply and demand, cause and effect, etc., etc., the understanding reached being that production must be kept within a limit that would maintain pool prices.

By a reference to the preceding tables it will be seen that the output has been increased 186,974 tons during the week ending February 14th, and 857,382 tons since January 1st. These tables tell the complete story.

From advices received during the week we believe that the production is going on at the same rate. It is very difficult to detect the animus which has prompted the trade to such action. The companies generally claim that while they may be exceeding the percentages allotted, they are not underselling, consequently they are not breaking any agreement. It is a generally conceded fact that there is a very unpleasant feeling existing among the companies. The Philadelphia *Press*, in speaking of the first week's tonnage for February, treats this point as follows: "Lehigh Valley ran ahead of the Reading, and the contest between the New York companies was warm. The shippers of the Ontario & Western and the Erie have made open war by reducing the price on all-rail coal to Newburgh 20 cents per ton, owing to sharp competition of some of the other companies. This reduction affects trade very little, but exhibits an unpleasant spirit on the part of the companies. It is well known that two big New York companies are at swords' points, and that the Pennsylvania Coal Company's management see that it is losing tonnage. On the surface of things the trade is all right, but privately it is conceded that the January agreement is likely to be broken."

The Reading Company has been accused of being the disturbing element of the trade. There may be ground for this belief. However, it is thought that President McLeod's annual report, which outlines what the company might do, etc., is responsible for a major portion of the speculation as to what the company is doing and will do. In this connection the *Evening Telegraph*, of Philadelphia, publishes a statement which it claims is official. It is as follows:

"It has been asserted that the Philadelphia & Reading Coal and Iron Company's increased tonnage production is an indication of that company having determined to cut loose from the agreed limit of production, but the presumption is not correct, as the officials of the company state that it has not exceeded its limit, nor does the management intend to do so."

The Philadelphia *Inquirer* takes a very pessimistic view of the situation, which it concludes as follows: "So far as learned, the companies have done nothing toward earnest restriction. The only thing that will save the trade is a suspension of work in every colliery three days each week for four weeks. Some of the shrewdest men of the trade regard a wreck as inevitable. The gravity of the situation cannot be expressed, and unless the presidents of some of the anthracite companies take the matter in hand promptly they will have more trouble on their hands than they have had since the war of 1879."

This is the uncertain time of the year for the hard coal trade. The months of February and March may be productive of much or little, the condition turning entirely on the weather. At present retailers are buying to meet light current demands, and it is generally conceded that a majority of them are not paying pool prices. We will not attempt to quote prices this week.

Bituminous.

The month of February has always been a very important one to the trade. It is the month during which the year's work is farmed out. Rates are agreed upon, pools and combinations formed, contracts made, etc. etc. Movements of this nature have thus far been retarded, owing to the delay of the railroad companies in coming to an understanding with the operators on the subject of transportation rates. However, during the past week the operators took the initiative, and it was not until the 19th that the railroad companies made a move toward establishing rates. Up to the present time many prominent members of the trade have maintained that the railroads could not force an advance over past year's rates; others have held stoutly to the opposite belief. The first act in this little war was sprung on the public Thursday by the announcement that the bituminous railroads of Pennsylvania had issued a circular to shippers doing business in central and northern New York, and at Hudson River points between Albany and Newburg, announcing an advance in freight rates of 25 cents a ton, to take effect April 1st. This of course does not affect rates to New York, Philadelphia, Baltimore and Norfolk, but it is believed to be simply a forerunner, and that if it is enforced rates to these latter points will also be advanced. Word was received this morning by certain members of the trade in this city, which caused them to make the prediction that rates will be advanced all along the line from 10 to 15 cents. An increase of this kind will not be secured without a fight.

The Seaboard Association, the organization which has had so many ups and downs, met yesterday (the 19th) in Philadelphia. Most of the companies were represented. In the face of the fact that the railroads had deferred announcing the rates for the year, it was impossible to take any definite action, and an adjournment was taken to Tuesday, the 24th inst. The career of this Seaboard Association has not been of a nature to inspire the confidence of the operators. However, the principles which it advocates are acknowledged by the trade to be good, and the general movement which is being made at this time is believed to be for the purpose of getting the organization on a footing. Even if the plans of those interested mature, it is doubtful if the association will do more than to fix the ruling price of last year as the minimum price at which the product can be sold during the ensuing year. The prime movers have the question of outputs and percentages in mind, but the lack of strength and concentration will prevent their becoming a part of the agreement.

The Grand Trunk Company has let but a very small portion of its coal contract. The Buffalo sales agents have agreed upon an advance of 20 cents over last year's prices, and seem firm in their determination to hold out for it. The amount called for at this point is 460,000 tons. The Portland portion of the contract, aggregating 32,000 tons, has been awarded at last year's prices. This confirms the ENGINEERING AND MINING JOURNAL's statement that certain contracts were being let last week at last year's prices.

The strike in the Connellsville coke region is now complete. Rainey's non-union forces, the last to hold out, have joined the strikers, and his 935 ovens, 833 of which were in operation last week, are idle. It is reported that a conference of the men and operators will be held within 10 days, and speculation is to the effect that a compromise on a basis of the old scale will be effected. The furnacemen have not yet seriously suffered because of the strike, as considerable coke was in transit to them. The companies are taking care of their own trade, dealing out supplies on hand. New orders for immediate delivery are taken at fancy prices. Quite a number of eastern furnaces, which desire to continue in blast, are substituting anthracite; others are closing down.

The market is much easier than it has been; there is a scarcity of coal on the lower ports, while at Sound points it is still a little difficult to obtain supplies. There is a large fleet of vessels at the ports and freights have dropped considerably. We quote rates as follows: alongside Philadelphia to Sound ports, 90 cents; to Portland, Boston, and Salem, $1; from Baltimore to Sound ports, $1; to Portland, Boston and Salem, $1.10@$1.15.

NOTES OF THE WEEK.

A dispatch from Baltimore states that work on the extension of the Maryland Central Railroad is being pushed, and an alliance with the Lehigh Valley Railroad to reach the anthracite regions is being negotiated.

For the year 1890 the quantity of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg & Erie was 17,-110,200 tons, an increase of 1,532,239 tons over the year 1889. Of this total tonnage 11,770,455 tons were coal, an increase of 823,083 tons, and 5,339,845 tons coke, an increase of 709,159 tons.

The Delaware Division Canal Company announces a dividend of $1 per share, payable on demand.

The report of the Lehigh Coal & Navigation Company for the year ended December 31st, 1890, which will be presented at the annual meeting on February 24th, shows: Revenue for the year—From the Lehigh & Susquehanna Railroad, $1,-712,110; from other railroads, $54,003; from canals, $45,517; Lehigh coal lands, $148,049; miscellaneous, $105,307; total, $2,065,049. Expenditures for general expense, rents, taxes, and interest were $1,140,121, leaving surplus earnings $924,927. Of this, $99,150 were appropriated to the coal sinking fund, $106,333 for depreciation of coal improvements, and $714,485 to the payment of two dividends aggregating 5%. The coal tonnage of the Lehigh & Susquehanna Railroad and Lehigh Canal for 1890 was 5,922,381 tons, a decrease of 153,-019 tons as compared with 1889. The gross receipts of the railroad were $5,136,331, a decrease of $163,-853. The receipts from coal decreased $358,445, but the receipts from passengers and mail increased $43,020, and from freights and express $151,555. The report says that the Lehigh & Susquehanna Railroad earnings was almost equal to that of the two largest years in the company's history; the decrease in coal transportation revenue was due largely to decreased tolls. The coal production of the company's own property was $1,272,514 tons, the largest it has ever made.

Mr. E. R. Holden, sales agent of the Delaware, Lackawanna & Western Company, returned to this city this week from a month's trip through Texas, Arkansas and other Southern States.

Mr. John S. Wise has been elected Secretary and Treasurer of the Delaware and Bound Brook and East Trenton Railroad companies.

The trade is watching with much interest the numerous bills relating to the coal mining industry which have been introduced in the Pennsylvania Legislature. One well posted operator who has just returned from Harrisburg may be quoted as having said that "those detrimental to the trade will not pass."

The Clearfield miners will hold their conference with the operators on the third week in March. They ask for an increase of five cents, and a reduction to eight hours.

On Thursday, the 26th, at 7 P. M., the Retail Coal Exchange will hold its fourth annual dinner at Morrello's. From present indications it promises to be the most successful dinner the Exchange has ever given. Besides a majority of its own members, a large number of invited guests, of New

York, Brooklyn and Jersey City, both in and out of the trade, have signified their intention of being present. An after-dinner programme of unusual interest has been arranged. Among those who will address the meeting are the following: Elliot F. Shepard, J. C. Curtz Crook; Jos. Howard, on the "Press"; James King Duffy, "City of New York"; Jas. Gleason, "Brooklyn Exchange"; A. M. Mathews, "New Jersey Exchange"; Jeremiah Pangburn, Jr., "Our Exchange"; N. J. Gates of F. A. Potts & Co., "Co-operation"; T. S. Mize, of the Chicago *Black Diamond*, "Our Building Fund." The president, Thos. Thedford, will deliver the opening address, and David McAdam will officiate as toast master. The proceeds of the dinner will be added to the building fund.

Mr. F. A. Brassler, one of the landmarks of the trade, is taking a well earned vacation. He left Saturday with his family for a land where the coal man in his professional capacity is ornamental but not useful. Those of his friends who wish at any time during the ensuing four weeks to ascertain the effect which the "prevailing warm weather is having on the coal trade" can reach him by addressing the Ponce de Leon, St. Augustine, Fla.

Boston.

Feb. 19.

(From our Special Correspondent.)

The demand for coal continues small. Prices are holding fairly well, although agents unanimously admit that it is a buyers' market, and do not hesitate to state that a large contract would call out some mighty low figures. Coal is coming forward at a fair rate, and most everybody appears to have a generous supply on hand.

The situation of the bituminous coal market has altered but very little in the past week. The receipts have been somewhat larger. The market tone is easier and lots have been offered on the cars here at $4. Gas coal is quiet and none of the companies appears to be in need of stocks. It is coming along fairly fast. Contract season is rapidly approaching, and while rumors of contracts having been placed are afloat, no large ones have been announced as yet.

Freights are ruling fairly steady. Ample tonnage is offering, but the nature of most of it is hardly desirable. Small vessels will command full figures. Rates are quoted from New York, 75c.@85c.; from Philadelphia, $1 and from Baltimore, $1@$1.15.

The retailers are having a fair February business. Most of them have large supplies on hand and are not buying anything to speak of. Prices continue to rule fairly steady.

Buffalo.

Feb. 19.

(From our Special Correspondent.)

Again there is nothing new to report relative to the anthracite coal trade in supply, demand or prices. The quiet trade of the present season seems to be destined to continue for some weeks, unless some unforeseen event should occur to change the situation. It is said, however, that quite a large quantity of coal is being delivered at wide apart points on old contracts.

The bituminous coal trade is dull, heavy, with lower figures quoted by dealers. Pittsburg is selling at $2.10 for run of mine, and $2.20 for screened and delivered on cars here. Common steam coal can be purchased at $1 90 delivered on cars here.

The contract for building the new Sault Ste. Marie Canal lock has been awarded at the figures of $1,268,000. The lock will be 800 feet long and 100 feet wide; with 21 feet depth at low water. For completion of work five years are allowed.

The quantity of coal transported in 1890 by the Delaware, Lacakawanna & Western Railroad Company was 8,039,469 tons.

The Buffalo, Rochester & Pittsburg, the Mahoning Valley, the Lehigh Valley and the Hudson River railroads are in the market making contracts for new cars. The Reading Railroad has ordered 3,000 ordinary and 1,000 gondola coal cars.

There has been some trouble relative to the letting of the contracts for the Grand Trunk Railway supply of coal, and report says the matter has been postponed indefinitely. The bids offered were higher than those of last year, or any previous year, but how much has not been stated. Among the Buffalo men present were: Mr. George H. Lewis, Capt. Brinker and Messrs. Thomas Loomis, J. M. Dick, E. K. Wick, E. B. Hill and W. D. Muller.

A Duluth newspaper states that 400,000 tons of coal are now on the Duluth and Superior docks—"a larger quantity than was ever held before at a corresponding period, even after a mild winter."

The retail dealers of coal in Rochester, N. Y., have formed an association for mutual protection.

Chicago.

Feb. 18.

(From our Special Correspondent.)

The anthracite market remains about the same as for some time past. The orders received are small and do not draw very heavily on stocks Wholesale prices have weakened a little, and are now quoted, per ton f. o. b. Chicago: Large egg, $5.25; small egg, range and chestnut, $5.50; Lehigh lump, $6.75. The retail prices fixed by the Chicago Coal Exchange are: Large egg, $6.75; small egg, range aud chestnut, $7.

The bituminous market shows but little change. In general it is a little weaker, but screenings for steam coal are quite active and rather scarce, and prices have advanced. Prices per ton of 2,000 pounds are: Pittsburg, $3.30; Hocking Valley, $3.10; Youghiogheny, $3.40; Indiana block, $2.40; Harrison lump, $2.15; Illinois screening, $1.00.

The demand for coke has increased but little in the past week and the market remains about the same. The strike of the coke burners has not affected it as yet and shippers are supplying their customers from stock as their wants demand. Stocks are sufficient to last from three to four weeks, it is claimed, and one local firm still has its plant in operation.

Prices remain the same; Connelsville, 72 hours, $4.95@$5.05; domestic crushed $4@$4.20.

Pittsburg.

Feb. 19.

(From our Special Correspondent.)

Coal.—The big strike along the Monangahela and Youghiogheny valleys is still on, and from appearances is likely to continue for some time, both sides being firm. The pools are full of empties waiting to be loaded. How long they will have to wait is beyond my ken. The coal men meet regularly, and are a unit against paying the advance. The Southern cities have sufficient coal to last for several months. There are still many miners at work in the fourth pool at the old rates. Nominal prices are as follows: River, wholesale on board, per 100 bushels, $4.50@$5.00; railroad, do., $5.00@$5.50.

Coke.—The only works in the Connellsville region now in operation are those of W. I. Raney, non-union. Mr. Raney will pay union wages, but refuses to recognize the union. The other plants are principally closed. Week's shipments, 5,436 cars; the car supply is ample. The indications are that the list of idle men in the region by the close of the week will number 15,000.

A well informed dealer has this to say: "The outlook for a resumption is not very bright, not only because the operators and their employés are very wide apart on the wage question, but also because the chief consumers of coke are unconcerned about their action. Eastern furnace men are making arrangements to get their coke supply from the Flat Top region. At Pittsburg most of the furnaces are stocked for months."

Prices: Furnace coke, $1.90; foundries, $2.30; crushed, $2.65, f.o.b. at works. Freights unchanged to all points.

METAL MARKET.

NEW YORK, Friday Evening, Feb. 20.

Prices of silver per ounce troy.

Feb.	Sterling Exch'ge	Lond'n Pence.	N. Y Cts.	Feb.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.
14	4 87¾	46	1.00	18	4.87¾	44¾	97½
16	4.87¾	45½	9 ⅛	19	4.87¾	45 1/16	98½
17	4.87¾	44¾	97½	20	4.87¾	45 1/16	98½

Owing to the prospects of no further silver legislation by this Congress silver has been very active at declining prices, and closes weak on an adverse report of the House Coinage Committee upon the Senate Bill.

The United States Assay Office at New York reports total receipts of silver for the week to be 130,000 ounces.

Silver Bullion Certificates.

NEW YORK STOCK EXCHANGE.

	Price. H.	Price. L.	Sales.
Feb. 14	100¼	100⅛	70,000
Feb. 16	99¾	99⅛	485,000
Feb. 17	99¼	97¼	5 2 000
Feb. 18	98⅛	97¼	318,000
Feb. 19	99⅛	98⅛	255,000
Feb. 20	99½	97¾	246,000
Total sales			1,966,000

Government Silver Purchases.

The Treasury Department informs us that the amount of silver purchased by the government during the past week was as follows:

	Offered, ounces.	Purchased, ounces.	Average price.
February 16	568,000	362,000	·9991
" 18	613,000	124.000	·9855

WASHINGTON, D. C., Feb. 20.—(By Telegraph).—The Treasury Department purchased 858,000 ounces of silver to-day.

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked.
Trade dollars	$ .77½	$ .79½
Mexican dollars	.77½	.79
Peruvian soles and Chilian pesos	.72½	.74
English silver	4.86	4.88
Five francs	.94	.95
Victoria sovereigns	4.85	4.88
Twenty francs	3.85	3.88
Twenty marks	4.74	4.78
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.80	4.85
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.60
Ten guilders	3.96	4.00
Bar silver	97¾	98

Foreign Bank Statements.

The governors of the Bank of England at their weekly meeting on Thursday made no change in its minimum rate of discount, which remains at 3%. In the week the bank lost £639,000 bullion, and the proportion of reserve to liabilities was lowered from 41·16% to 39·07%, against an advance from 46·87% to 50·03% in the corresponding week last year, when its discount rate was reduced from 6% to 5%. The bank on the 19th inst. lost £17,000 bullion on balance.

Copper.—There has been decidedly more life in the market this week, and several important contracts are reported as having been made. The feature of the week has been that orders have been solicited for Lake copper at 14c.; and as it has become known that negotiations with the larger producers took place early in the week in Boston, it is generally supposed that this is a forerunner of the price of Lake copper being officially reduced to 14c. before long—probably from the commencement of next month. This has already been anticipated by the trade for some time past, and it would appear that at that figure quite an important business should result.

Arizona copper is held very firmly and is not obtainable below 13¼c., and casting copper is decidedly firmer at 11½@11¾c. It was principally in the latter grades of copper where the large transactions were completed, the price being considered especially cheap, even with Lake at 14c.

The quantities of copper which are leaving the principal ports here by each steamer are very heavy, and exporters in many instances find it a difficult matter to secure freight accommodation.

The London market has exhibited great firmness and prices are reported as being decidedly better, showing an advance of about 15s. for the week. Chili bars closed at £53 2s. 6d.@£53 5s. cash and £53 10s.@£53 12s. 6d. for 3 months prompt.

We quote as follows: English tough, £55@£55 10s.; best selected, £58@£58 10.; strong sheets, £64@£64 5s.; India sheets, £60; yellow metal sheets, £5⅝d.

The statistics show a decrease for the first half of February of 1,000 tons; but these figures are without any charters from Chili, where the political disturbances still continue. Considering the heavy arrivals of American copper in Europe, this may be considered as a satisfactory result.

The exports of copper during the past week were as follows:

		Lbs.	
To Liverpool—	Copper matte.		
By S. S. City of Chicago.	11,617 bags	1,305,351	$75,000
" "	Copper. 44 casks	55.000	7,250
" Richmond Hill.	27 "	33,750	5,000
" Otaka	90 "	112,000	14,560
To Hamburg—			
By S. S. Moravia	1 cask	550	70
To Antwerp—			
By S. S. Apollo	90 casks	118,620	18,600

Tin.—This has been rather irregular in consequence of the unsettled state of the market in London. Some sales were effected early in the week in a few isolated cases at 19·85c., but latterly a better tone prevailed, and nothing is now obtainable below 19·90@20c. for February and March delivery, and for later months this article is held for higher prices.

The London market was flat, and during the week touched £98 10s. for cash, but closes somewhat firmer at £99@£99 2s. 6d. for spot, and 10s. higher for three months prompt.

Lead.—Lead has been dull, and the small orders which presented themselves have been eagerly competed for. Considerable quantities of lead are being offered for sale at about 4·30c., but without finding any buyers. It is now becoming more apparent that Western producers are desirous of disengaging themselves of their holdings as quickly as possible, as the belief is gaining ground that before long legislation, in some form or other, will ensue by which Mexican ores will again be admitted into this country free of duty. The London market is reported firmer at £12 10s. for Spanish, and £12 15s. for English lead.

St. Louis Lead Market.—Messrs. John Wahl Com. Company, telegraph us as follows: "We can report no change in pig lead. The metal is in a state of quietude. Transactions are of a retail character only; buyers, having no faith in any advance, are content to look on. Nominal value for spot and nearby future delivery is 4·05@4·07½c.

Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: Market very quiet at 4·10c. Consumers are apathetic and only light sales are reported at 4·10@4·12½c.

Spelter.—The market is decidedly flat and hardly more than 5@5·10c. New York is obtainable. Consumers seem to be overstocked, and are unwilling to purchase even at these figures, at which price purchases can be made for a considerable time ahead. There is very little doubt that stocks must have accumulated at the works of some of the consumers.

London is quoted for Ordinaries at 24·10, and for Specials at 24.15.

Antimony.—There are no new features to report since last week, the market remaining

steady at 17¾@18c. for Cookson's, 17c. for L. X. and 16½@16¾c. for Hallett's.

Quicksilver.—The inactivity which has prevailed in both the foreign and domestic markets continues the dominent feature. Inquiry and demand are equally imaginary and values remain stationary. Our quotations are: £8 12s. 6d. abroad for first in second hands sales of small lots have been made at £8 11s. 6d. Domestic quotation remains $48@$50.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 20.

Practically the same condition of things exists in the iron market this week as last. Trade has undoubtedly been a little better, but the improvement can by no means be regarded as permanent. Many consumers who have allowed their stocks to run down have been in the market again, and have placed a number of orders, but buying still continues to be done upon a small scale only. Prices remain at about the same points. The curtailment of production during the past seven or eight weeks has probably helped to strengthen the market considerably; Southern furnaces are now blowing in again rapidly, however. The situation in the Mahoning and Shenango valleys remains the same.

Reports from inland cities, although somewhat irregular, indicate a rather increased demand for pig iron, with slightly stiffening prices on account of the coke strike in the Connellsville region. There is much uncertainty felt in the iron market, however, as to whether this will be of long duration or not, and its effects, consequently, have not yet become important. In New York it has not caused a ripple in the trade so far. Reports from Pennsylvania state that many furnaces have commenced to use anthracite to help out their stocks of coke.

American Pig Iron.—Dealers report somewhat increased inquiry and more sales. Prices of Northern brands, however, are no firmer. There is a scarcity of Southern iron, and many orders cannot be filled. Dealers express an indisposition to sell at present prices. There is much less Southern iron coming into the New York market now than at the same time last year, and a corresponding increase in the amount of the Northern. We quote prices: Northern iron, No. 1x, $17.50@$18; No. 2x, $16.50@$17; Southern, No. 2x, $15.50@$16.50.

The American Pig Iron Storage Warrant Company states that it is making steady and satisfactory progress in its business. At the end of its first year it had received in store 22,900 tons of iron. During its second year, which closed about two months since, it received 58,200 tons, making a total of 81,100 tons received, out of which there had been delivered during the second year 16,300 tons, leaving a balance on hand at the close of the second year of 64,800 tons, which are in warrant yards located as follows: New York, 2,700 tons; New Jersey, 3,900 tons: Kentucky, 1,500 tons; Alabama, 58,700 tons.

Spiegeleisen and Ferromanganese.—But a trifling amount of business is being done, and all that in small lots. The market continues as dull as it has been for a month and more past. Quotations are only nominal. 20% Spiegeleisen, $28@$29; 80% ferromanganese, $63.50@$64 at tidewater.

Steel Rails.—But small orders have been placed for rails during the past week, and there have been but few new inquiries. The rolling mills are maintaining the price firmly at $30.

Rail Fastenings.—Business is still very dull, and for what orders come into the market there is strong competition. Prices remain unchanged, and we quote: Spikes, 2c.; angle plates, 1·70@1·80c.; bolts and square nuts, 2·75c.; hexagonal nuts, 3·00c.; complete joint, iron and steel, according to weight.

Tubes and Pipes.—There is no change. Business continues good for this season of year. We quote discounts on carload lots as follows: 47½% on butt, black; 40% on galvanized; 60% on lap, black; 47½% on lap, galvanized; boiler tubes: 50% on all sizes; casing, all sizes, 50%.

Structural Iron and Steel.—The market continues dull, with small sign of improvement. Dealers are only finishing old orders, and report little new business.

Merchant Steel.—Trade is good, but the increased activity has not yet resulted in stiffening prices. We quote, as last week: Best English tool, 15c., net; American tool steel, 7@8c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3¾c.; open-hearth machinery, 2·60c.; open-hearth spring, 2·60c.; tire steel, 2·60c.; toe calks, 2·60c.; flat file, 4½c.; mill file, 4½c.; taper file, 7c.; first quality sheet, 10c.; second quality sheet, 8c.

Old Rails.—There is no business of consequence, and the price remains nominal at $23 for tees and $25 for doubles.

Wrought Iron Scrap.—The market is still very quiet, and we hear of sales of nothing but small lots. We quote from $21 to $22.

Chicago. Feb. 18.

(From our Special Correspondent.)

The general iron trade has increased in volume during the past week. Prices have been cut a little in manufactured iron, and quite a large number of small orders have been booked. Som orders have been received from the railroads, an the outlook for improvement in the near future is considered fair.

Pig Iron.—Business has not been large during the past week, but inquiries have been quite numerous. Furnace men are holding for higher prices, which consumers do not feel disposed to grant. They are not anxious to sell, claiming to have orders some weeks ahead of them. The coke trouble also tends to stiffen the pig iron market.

Prices to-day per ton of 2,240 pounds f. o. b. Chicago are: Lake Superior charcoal, $18 50; Lake Superior coke, No. 1, $16; No. 2, $15.50; No. 3, $15; Lake Superior Bessemer, $17; Lake Superior Scotch, $17; American Scotch, $18.50; Southern coke, No. 1, $16.25; No. 2, $15.75; No. 3, $15.25; Southern No. 1, soft, $15.75; No. 2, soft, $14.75 Southern Grey Forge, $14.50; Tennessee Charcoal, No. 1, $18@$19; No. 2, $17.50@$18.50; Alabama Car Wheel, Nos. 1 and 2, $21@$22; Nos. 3, 4, and 5, $22@$23.

Structural Iron.—There is at present but little doing in structural iron. Winter bridge building is about over, and it is too early for the spring building trade. The indications, however, for a very large spring trade are quite fair, as inquiries are being received in good numbers. Small orders are about all that is doing this week. Prices for car lots, f. o. b. Chicago, are: Angles, $2.25@$2.30; universal plates, $2.40@$2.50; tees, $2.75@$2.80; sheared plates, $2.50; beams and channels, $3.20. Prices for small lots are from 30c. to 50c. higher.

Bar Iron.—Business has fallen off somewhat the past week and shows but little activity. Inquiries are few and orders small. Local mills quote $1.70 half extra f.o.b. Chicago, and Valley mills $1.60 f.o.b. mills.

Black Sheet Iron.—The market is very quiet and prices remain the same, $2.80@$2.90 for No. 27.

Galvanized Sheet Iron.—Trade has been quite active during the past week and mills have received quite a number of good orders—enough to keep them busy for some time. Discounts remain unchanged at 67½ off on Juniata and 65% and 5% off on charcoal. Jobbing lots are quoted according to quantity.

Merchant Steel.—Small orders are being received in good number from the city trade, but large orders are very scarce and the railroads are buying but little. Prices remain the same. Tool steel, 6·75c.@7c.; tire steel, 2·40c.@2·70c.; toe calk, 2·50c.@2·60c.; open hearth machinery, 2·40c.@2·70c.; open hearth spring, 2·50c.@3c.; Bessemer machinery, 2·20c.@2·30c.

Nails.—But little business has been done in nails this week and inquiries are few. Quotations are: Steel wire nails at $2.20@$2.25; steel cut nails at $1.80@1.85.

Plates.—Business has been very satisfactory in plates for the time of year, although no large orders have been placed, and slight concessions have been made to buyers. The outlook is very good for a spring trade. Quotations are: Steel plates, 10 to 14, $3.10@$3.25; iron plates, 10 to 14, $2.70@$2.90; tank iron, $2.60@$2.70; tank steel, $2.80@$2.90; shell iron or steel, $3.20@$3.30; firebox iron or steel, $4.75@$5.50; flange steel, $3.50; boiler rivets, $4@$4.25.

Tubes.—The market has been very quiet and but little business done. Discounts remain the same for two inches and larger 50%, and for 1¼ inches and smaller 45%.

Steel Rails.—Trade in steel rails has been quite active the last two or three days and local firms have accepted some good-sized orders. Inquiries are also received in good numbers and the market looks stronger. Prices are $31@32 f.o.b. Chicago.

Scrap.—The scrap iron market has improved a little, particularly in the lower and higher grades. The starting up of a local mill, which has been idle for some time, has brought a large consumer in the market again, and tends to strengthen the market. Dealers quote prices as follows, per net ton. f. o. b. Chicago; No. 1 Railroad, $20; No. 1 Forge, $19; No. 1 mill, $14.50; fish plates, $22; axles, $25; horseshoes, $19; pipes and flues, $13.50; cast borings, $8.50; wrought turnings, $11.50; axle turnings, $13; machinery cast, $12.50; stove plates, $8.50; mixed steel, $10.75; coil steel, $15.50; leaf steel, $16.50; tires, $18.

Old Wheels and Rails.—Old iron rails are considerably firmer this week, and are now held at $23.75@$24. Old steel rails have also improved in price and the demand for long lengths is good. They are selling at $19.50 for long and $15 for short lengths. Old car wheels are quoted at $17, with little business.

Cleveland, O. Feb. 19.

(From our Special Correspondent.)

The situation in the iron market has been about the same during the week. There has been an advance in price of pig iron, owing to the shut-down of the furnaces, but this advance has not yet affected the ore market.

Rumors are current that Gogebic hematites have been sold to Pittsburg parties for next year's delivery at $1.25 less per ton than last year's price. This would make the best grades of Gogebic ores about $4.75 per ton. There have also been some few inquiries and sales in small lots for immediate delivery.

A sale was made the other day to a furnace in the Hanging Rock region, of a second grade hematite ore, represented to run 55 per cent. in iron, at the very low price of $2.75 per ton at Lake Erie ports. The ore, however, is saturated with alumina, and is dear at any price. No business has yet appeared in Lake transportation matters. Quotations remain unchanged.

Philadelphia. Feb. 19.

(From our Special Correspondent.)

Pig Iron.—Every one connected with the iron trade is looking for an improvement both in demand and price. On the other hand brokers and furnace people are too anxious to get business to actually put prices up. This week's business has been done at last week's prices; a general demand would send prices up in a week or two possibly 25 cents per ton, that is, sellers say so, but buyers do not believe it. Buyers are unconcerned about the future of the market, and are satisfied that production will keep competition active in their interests. Forge irons were quite freely inquired for this week, but only moderate sales have been made. Prices have been $14.50 for most iron sold; more or less No. 2 iron has been selling at $16.50, but it takes rather a good brand to secure that price. No. 1 foundry is selling at about $17.50, though other brands are selling at less and more. There are better prospects this week than for some time, but a good deal of uncertainty still exists. Southern No. 2 iron has been offered at $16, and No. 1 at $17.

Foreign Material.—Prices for spiegel are $29; for ferromanganese, $62. Two or three brokers have done some business.

Steel Billets.—Large buyers are awaiting developments, they say; what it is they expect, manufacturers cannot understand. The latter say there is more probability of prices hardening than weakening. Liberal offers have been made to ship billets into this market at $29.

Muck Bars.—Prices are $26.50@$27. There are a good many parties ready to buy if their views would be acceptable to makers, but they are not; buyers are all getting along with as little muck bar as possible.

Merchant Iron.—Some millmen from the interior say that things are beginning to brighten; whatever improvement is likely to take place, however, will not help prices much. There is such an enormous bar-iron capacity in this state seeking business that it is out of the question to expect strong prices. Some mills are quoting as high as $1.90 for refined, but there is more iron sold at $1.75. There is nothing very satisfactory to report.

Nails.—An active effort has been made to unload nails. Car lots have been offered at $1.75, delivered at tide-water points, and there are rumors of shaded quotations below this price; buyers generally are hanging back, and nail factories are not running full time.

Skelp Iron.—Grooved skelp is $1.75, sheared $1.90; small lots have been sold this week.

Sheet Iron.—The manufacturers of sheet iron of all kinds are determined to have stocks sufficient to meet their customers' requirements. The mills are running full time, and everything seems satisfactory. On small orders card prices are being paid, but it would be impossible to give quotations on exceptionally large orders.

Merchant Steel.—The merchant steel manufacturers claim that there has been better inquiry during the past week or so, and this is evidently the case.

Plate and Tank Iron.—Those who are booked upon the subject of plate iron state that there has been a general quiet improvement in orders during the past few days. The new orders have been taken at very low figures. Ordinary quotations are 2 cents for ship plate, tank and bridge plate, for iron; steel, $2.10 for ship and tank; for steel bridge plate, $2.15@$2.20; steel shell, $2.50. There is still, of course, sharp competition on large orders, but there are very few of them.

Structural Iron.—The general run of business is made up of small orders; angles and sheared plates have been quoted at $2.10 this week; tees are $2.50; beams and channels, $3.10.

Steel Rails.—Two or three large orders have been placed, and $29.50 is now given as inside price. One broker states that the inquiries on the market this week are for between 70,000 and 80,000 tons, which is quite likely.

Old Rails.—Seaboard lots of old rails were offered to-day at $23, but buyers are not likely to pay that.

Scrap Iron.—No. 1 railroad scrap will bring $22 delivered; machinery scrap, $15; cask borings $11.

Pittsburg. Feb. 19.

(From our Special Correspondent.)

Raw Iron and Steel.—The advance noted in our last in regard to leading descriptions of iron and steel has been maintained. There is no sign of weakening. The disastrous flood in the Allegheny and Monongahela rivers caused a falling off in the demand. Still, taken as a whole, sales show up fairly well. The general indications are favorable for the iron trade, as buyers are trying to duplicate purchases at prices that ruled a short time ago. This, however, cannot be done. This statement correctly defines the position which, as al-

ready stated, appears to be in the direction of improvement.

The curtailment in production has reached a point which will soon be felt. A decrease of over 40,000 tons per week is certainly a great shrinkage, and while there is a large falling off in consumption, it is not thought to be as heavy as this and moreover there are indications of a decided improvement in some departments. The accumulation of iron and steel during the early winter months is doubtless inimical to any immediate change of tone, but these stocks will soon be taken up and then the market will stand on its own merits.

Locally things are by no means in bad condition. As usual the largest inquiry is for the better grades of pig iron. The reputation of Pittsburg furnaces is such that they always command the top of the market. At various times several lots of iron have been sold below current rates, but the lots were large, and in some instances brands not thoroughly established, so that special inducements were necessary to secure desirable purchasers. Prices of iron in the east are materially above Pittsburg rates, in some instances fully one dollar more per ton being paid. Prices of iron in the Mahoning and Shenango Valleys are firm, holders showing a commendable amount of independence.

The big coke strike inaugurated on the 11th inst. is still going on, and unless all signs fail will be continued for some time to come. The furnaces at most points have an abundant supply of coke, sufficient in most cases to run them for months. When that is consumed, if no more is obtainable, they will, of course, close down. On the other hand, coke workers say, as usual, that the fight will be continued to the bitter end. To an outsider it looks as if the longest purse will be pretty apt to win.

There does not yet seem to be any indication of a settlement. The number of idle men in the coke regions can be counted by thousands.

The Monongahela coke strike, which began on the 1st of January, shows no indications of settlement.

The following sales are reported:

Coke Smelted Lake and Native Ores.

2,500 Tons Bessemer	$16.00 cash.
1,500 Tons Bessemer	16.25 cash.
1,500 Tons Grey Forge	14.25 cash.
2,000 Tons Grey Forge	14.00 cash.
2,500 Tons Grey Forge	14.25 cash.
1,500 Tons Grey Forge, Southern	14.10 cash.
1,000 Tons Grey Forge, City Furnace	14.50 cash.
1,000 Tons Bessemer	16.00 cash.
600 Tons No. 2 Foundry, City Furnace	15.75 cash.
500 Tons Mottled Southern	13.75 cash.
500 Tons Grey Forge, City Furnace	14.50 cash.
500 Tons Grey Forge, delivered	14.50 cash.
500 Tons No. 3 Foundry	14.50 cash.
200 Tons No. 2 Foundry, all ore	16.00 cash.
100 Tons No. 1 Foundry	16.50 cash.
100 Tons No. 2 Silvery	16.00 cash.

Charcoal.

80 Tons No. 2 Foundry	22.00 cash.
75 Tons Cold Blast	36.00 cash.
70 Tons Warm Blast	22.50 cash.

Steel Slabs and Billets.

2,000 Tons Billets	26.25 cash.
1,500 Tons Billets and Slabs	26 60 cash.
500 Tons Billets	26.00 cash.

Muck Bar.

1,200 Tons Neutral	27 75 cash.
1,000 Tons Neutral	27.25 cash.
350 Tons Neutral	27.50 cash.

Steel Wire Rods.

500 Tons American fives	38.60 cash.

Ferro-Manganese.

87 Tons 80% f. o. b., Jersey City, May	63.50 cash.

Steel Bloom.

500 Tons Bloom Ends	17.50 cash.

Scrap Material.

300 Tons Iron Axles, net	29.00 cash.
300 Tons Cast Scrap, gross	14.50 cash.
200 Tons No. 1 W. Scrap, net	21.00 cash.
200 Tons W. Iron, Turnings, net	14.00 cash.

Skelp Iron.

500 Tons Wide Grooved	1.75 4 m.
200 Tons Narrow Grooved	1.72½ 4 m.
200 Tons Sheared Iron	2.00 4 m.

Old Iron Rails.

1,000 Tons American T's	24.00 cash

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Feb. 20.

Very little has been doing in heavy chemicals during the past week. Consumers are holding off because they believe there is a possibility of prices dropping lower. Stocks generally are very small and a few large orders would probably be sufficient to give the market an entirely different tone. Dealers think that the first indication of stiffening values will cause the immediate appearance of a lot of anxious and, possibly, disappointed buyers. Almost all arrivals have come in on contract. Dealing in nitrate of soda has been brisker, if anything, than heretofore, and attended by a sharp upward movement. The price of brimstone continues so high that buyers are holding back, supplying nothing but immediate wants.

Caustic Soda, 60%.—Prices remain as quoted last week: 3·27½@3·32½c. Very little has been doing. No arrivals of moment are reported, and most of what has come in has gone into second hands under contract. 70@74%—This has come in somewhat larger amounts than last week, but very little demand has made itself felt. 77%—The stock supplies are such that there is but little dealing. Prices remain about 3·12½@3·15c. Alkali, 48%, has continued to come in in fair quantities. The bulk of arrivals has been on contract, and inquiry resulting in both spot sales and sales to arrive has been a feature of the market. We quote 1·60@1·65c. 58% has been firm at 1·50@1·55c., with quite a little changing hands. Arrivals are coming in freely, and no stocks are accumulating.

Carbonated Soda Ash, 48%.—Very little has been doing, and there is scarcely any demand noted. Values are a little unsteady, ranging between 1·57½@1·62½c. There are no large stocks here. High test is changing hands in small quantities. The tone of sellers is not very confident, notwithsanding that they are holding for higher prices than buyers seem inclined to give. Dealers are asking 1·50c.@1·55c., as to time, quantity, etc.

Caustic Soda Ash, 48%. The stock available for spot delivery is very small. An order for any quantity would probably leave the market bare. Buyers are waiting for a decline, while the market continues firm at present figures with apparently no signs of future weakening. Hardly any business has been doing We quote 1·60@1·65c.

Sal Soda.—A fair stock of foreign is reported to us, and some business, though not of much consequence, has been doing. Spot is selling much higher than contracts to arrive, which we quote at 1·10@1·12½c. Domestic still continues to find an easy market at from 1@1·05c.

Bleaching Powder.—This market continues firmer than it has been for some time past. The demand during the week has been a little larger. Stocks remain small and dealers are holding at 1·70@1·75c.

Acids.—The unsettled condition of affairs, which has, during the past year, been so characteristic of this market continued during the week, and seems, in addition, to have been attended by almost a complete absence of sales. This month is not generally a very good one, and the increased price of raw materials, making manufacturers not over desirous to sell, may have contributed toward this natural inactivity.

A little business in acetic, nitric and muriatic acids has been reported, but this seems to have been entirely of a jobbing nature. We quote acids per 100 pounds in New York and vicinity: Acetic, $1.55@$2; muriatic, 18°, 80c.@$1; muriatic, 20°, 90c.@$1.10; muriatic, 22°, $1@$1.20; nitric, 40°, $3.25@$4. Nitric, 42°, $3.50@$4.25; sulphuric, 60°, 70@85c.; sulphuric, 66°, 75@90c.

Fertilizing Chemicals.—Business has been good. The demand for almost all grades of fertilizers was active and a considerable quantity has been changing hands. The speculative elements have continued their hold on the market, and neither in brimstone nor nitrate does the limit of their possibilities appear to have been demonstrated. South Carolina phosphate rock has met with a fair demand, prices have been well maintained and frequent inquiry, in some cases, resulted in large sales. We quote: Rock, f.o.b. Charleston, $7.15@$7.25; freights by sail from Charleston to New York, $1.75; ground rock $8@$11.50. Business in sulphate of ammonia has been very active; the domestic production of gas liquor has been nil. Lots on the way have been almost entirely sold, and the market on the other side is much firmer than it has been heretofore. These conditions have all united in increasing values. The small spot supply which remains is held at 3·25c.; for shipment and to arrive 3·20@3·22½c. Bone sulphate is selling at much higher figures than at the time of our last report. We quote 3·17½@3·20c.

Brimstone.—The regular advance of 50c. a week, which has been noted during the past month, has again to be recorded. Buyers are fighting vigorously, but we hear of no indications of weakening, and everything tends toward still higher prices. These are naturally dependent upon the continuance of the corner in Sicily. We quote $28 for best unmixed seconds, and 50c. less for thirds. Not much is coming in and buyers are only filling wants.

Nitrate of Soda.- The week has witnessed an abrupt rise in values; and although every indication has pointed that way, and the amounts on hand and near by given in former issues of the ENGINEERING AND MINING JOURNAL, many were surprised by its suddenness. Business has not been very brisk, and few sales involving more than 200 or 300 bag lots have come to our knowledge. The uncertainty as to the possible termination of the war is the main cause of the unsteadiness of the market.

We quote 2@2.05c for spot and 2c for next vessel, due in about a week or 10 days. Stock here is pretty well depleted but that abroad is said to be large, and several large charters have been made.

Muriate of Potash.—The arrivals have been quite large, fully 600 tons having been reported as arrived. Inquiry continues strong resulting in both spot sales and sales to arrive. About 200 tons went into second hands. Quite large quantities are said to be near by and on the way.

NOTES OF THE WEEK.

At the statutory general meeting of the shareholders of the United Alkali Company, Limited, held at Liverpool, the local directors decided to pay the river dues levied on chemical products exported from the Tyne. This will make a difference of 6d. per ton on caustic soda, 3½d. per ton on bleaching powder, soda ash and white alkali, and 1½d. per ton on soda crystals and sulphate of soda. The payment of these dues by the manufacturers instead of the shippers will place the Newcastle chemical merchants on the same footing as their Liverpool colleagues, who do not pay such dues. A statement of the present position and prospects of the company was submitted to the meeting by Mr. John Brock, chairman of the directors, and is in the main as follows: The vendors of the chemical works took, in part payment of the property turned over to the United Alkali Company, stock and shares to the amount of £5,391,200, and the general applications amounted to £1,774,250; together, £7,165,450, leaving £1,334,450 still to raise to complete the capital and debenture stock of £8,500,000. This balance they intend to offer unreservedly for public subscription.

They have in all 48 works, 45 of which are chemical works, and three salt works; 42 of these works are in England, 4 in Scotland, and 1 each in Ireland and Wales. They control the Leblanc departments of 5 others, and have working agreements with several more, in which articles similar to those produced in the works of the company are manufactured. In 15 of the works entirely new and extensive plants have been erected for the extraction of sulphur from waste material.

The company owns many miles of railway, upward of 2,000 railway wagons, about 60 locomotives, eight steamers, 88 other vessels, and in addition to the chemical and copper works has extensive brick and pipe works, quarries of limestone and building stone, a considerable number of houses for managers and workmen, and a large land acreage, much of it freehold. Comparing the total output of the three soda-ash manufacturers by the ammonia process with the total output of the Alkali Company, the latter stands for over 90% of the whole.

Liverpool. Feb. 11.

(Special Correspondence by J. P. Brunner & Co.)

There is a moderate amount of business passing in heavy chemicals generally, but prices, being on one dead level, it is rather of a monotonous character.

The United Alkali Company, Limited, held its statutory meeting on the 5th inst., and this week opened a subscription list for about £1,300,000 in ordinary and preference shares and debenture stock. No information is reported as to how this stock is going off, but it was expected that the preference and debenture stocks would at least find favor with investors.

Soda ash is scarce as regards carbonated, which is held for 1⅝d.@1½d. per degree per hundred weight, according to brand and quantity. Caustic ash is quiet. Quotations range from 1⅞d. @ 1⅝d. for 48%, and 1⅜d.@1½d. for high test.

Soda crystals quiet but steady at £3 10s. per ton.

Caustic soda is meeting with a fair inquiry, and in the absence of resellers full prices have to be paid for anything wanted. We quote: 60%, £10; 70%, £11 5s.; 74%, £12 5s.; 76%, £13 5s. and up, but a reduction of 5s. per ton on these quotations allowed for transactions extending over six or twelve months.

Bleaching powder is meeting with little attention from buyers, but no hardwood to be had at under £7 per ton.

Chlorate of potash is selling at 5½d. per pound.

Bicarb. soda in fair demand at £7 per ton and upward, for 1-cwt. kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of ammonia is firmly held, manufacturers generally being disposed to hold aloof as they look for higher prices. For prompt delivery, £11 3s. 9d.@£11 5ls. per ton for good gray 24% in double bags f. o. b. here are nearest values, but business is curtailed owing to buyers' and sellers' views as to prices being rather apart.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, Feb. 20.

The slight activity which has been a prominent feature in building circles for several months past, and which is nothing more than should be expected at this time of the year, continues at this writing. Bricks have come in in not very large quantities, and have met with a small demand, but no disposition to fill anything but immediate wants has been shown. The change in the weather makes itself felt almost immediately, and naturally business is restricted under such conditions.

Both Haverstraws and Jerseys have come in and stocks remain unsold, but not sufficiently large to give dealers any anxiety. The weakening in values of pale, noted in our last report, continues. Probably the most noticeable feature of the market is its extreme sensitiveness. We quote: Haverstraws, $6@$6.50 per M.; pale, $2.75@$3.25; Jerseys, $5@$5.50; $6@$7 for Long Island and Staten Island.

Lime.—The slight boom in this market continues, but values cannot be said to firm. The demand is fair though not large enough to cause any great increase in arrivals. All that which has come in has gone into second hands and more is said to be on the way. The season is not yet sufficiently advanced to permit of any increase in stocks without a corresponding fall in values. We quote Rockland common, $1.10; finishing, $1.20.

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and Amount of last			Dividends. Total paid.	Date & amount of last.		
1	Adams, S. L.	Colo.	$1,500,000	150,000	$10	*	.....	.....	.....	$562,500	Feb.	1891	.05
2	Alice, S. C.	Mont.	10,000,000	400,000	25	*	.....	.....	.....	395,000	Dec.	1890	.05
3	Almack Nel'y Wood C. G.	Idaho	330,000	30,000	10	*	.....	.....	.....	60,000	Jan.	1889	.50
4	American & Nettie, C.	Colo.	.....	300,000	.....	.....	.....	.....	.....	150,000	Nov.	1889	.10
5	Amy & Silversmith, S.	Mont.	.....	341,419	.....	.....	.....	.....	.....	247,530	Aug.	1887	.12½
6	Atlantic, C.	Mich.	1,000,000	40,000	25	$280,000	April	1875	$1.00	700,000	Feb.	1891	1.00
7	Argenta, S.	Nev.	10,000,000	100,000	100	335,000	July	1889	.10	40,000	Feb.	1890	.30
8	Aspen Mg. & S., S. L.	Colo.	2,000,000	200,000	10	*	.....	.....	.....	40,000	Feb.	1891	.10
9	Aurora, L.	Mich.	2,000,000	100,000	20	*	.....	.....	.....	155,000	Oct.	1887	1.87½
10	Badger, S.	Ont.	250,000	50,000	5	*	.....	.....	.....	37,500	Mar.	1890	.25
11	Bassick, G. S.	Colo.	10,000,000	100,000	100	*	.....	.....	.....	400,000	Mar.	1884	1.00
12	Belle Isle, S.	Nev.	10,000,000	100,000	100	190,000	Dec.	1889	.15	300,000	Dec.	1879	.25
13	Belcher, G. S.	Nev.	10,400,000	104,000	100	2,978,000	June	1890	.50	15,397,000	April	1876	1.00
14	Bellevue, Idaho, S. L.	Idaho	1,250,000	125,000	10	120,000	Dec.	1889	.25	300,000	Jan.	1890	.10
15	Bi-Metallic, S.	Mont.	5,000,000	200,000	25	*	.....	.....	.....	800,000	Feb.	1891	.35
16	Bodie Con., G. S.	Cal.	10,000,000	100,000	100	550,000	June	1890	.25	1,602,572	April	1885	.50
17	Boston & Mont., G.	Mont.	2,500,000	250,000	10	*	.....	.....	.....	520,000	June	1886	1.50
18	Boston & Mont., C. S.	Mont.	2,500,000	100,000	25	*	.....	.....	.....	1,700,000	Feb.	1891	1.00
19	Breece, S.	Colo.	5,000,000	200,000	25	*	.....	.....	.....	2,000	Feb.	1890	.01
20	Brooklyn Lead, L. S.	Utah	500,000	50,000	10	.....	.....	.....	.....	127,000	July	1887	.05
21	Bulwer, G.	Cal.	10,000,000	100,000	100	130,000	Aug.	1889	.25	175,000	Jan.	1884	.10
22	Bunker Hill & Sull.	Idaho	3,000,000	300,000	10	*	.....	.....	.....	150,000	Oct.	1883	.06⅔
23	Caledonia, G.	Dak.	10,000,000	100,000	100	505,000	May	1885	.15	194,000	Oct.	1890	.08
24	Calliope, S.	Colo.	1,000,000	1,000,000	.....	.....	.....	.....	.....	140,000	Jan.	1891	.01½
25	Calumet & Hecla, C.	Mich.	2,500,000	100,000	25	1,200,000	.....	.....	.....	35,350,000	Jan.	1891	5.00
26	Carbonate Hill, S. L.	Colo.	1,500,000	300,000	10	*	.....	.....	.....	80,000	April	1884	.05
27	Carlisle, G.	N. M.	1,000,000	200,000	5	.....	.....	.....	.....	175,000	Dec.	1888	.12½
28	Castle Creek, G.	Idaho	100,000	10,000	10	*	.....	.....	.....	51,000	Oct.	1883	.05
29	Catalpa, S. L.	Colo.	3,000,000	300,000	10	*	.....	.....	.....	270,000	May	1884	.10
30	Central, C.	Mich.	500,000	20,000	25	100,000	Oct.	1861	.65	1,970,000	Feb.	1891	1.00
31	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*	.....	.....	.....	1,650,000	Dec.	1884	.25
32	Colorado Central, S. L.	Colo.	2,750,000	275,000	10	*	.....	.....	.....	406,250	Aug.	1889	.05
33	Commonwealth, S.	Nev.	10,000,000	100,000	100	170,000	Nov.	1888	.50	30,000	Nov.	1890	.20
34	Confidence, S. L.	Nev.	.....	24,000	.....	328,880	May	1890	.75	99,600	April	1889	1.00
35	Cons. Cal. & Va., G. S.	Nev.	21,600,000	216,000	100	108,000	Jan.	1885	.20	3,466,800	April	1890	.25
36	Contention, S.	Ariz.	12,500,000	250,000	50	*	.....	.....	.....	12,587,500	Dec.	1884	.25
37	**Cop. Queen Con., C.	Ariz.	1,400,000	140,000	10	.....	.....	.....	.....	210,000	Feb.	1889	.50
38	Crescent, S. L. G.	Utah	15,000,000	600,000	25	*	.....	.....	.....	228,000	Oct.	1888	.03
39	Crown Point, G. S.	Nev.	10,000,000	100,000	100	2,425,000	Sept.	1889	.50	11,588,000	Jan.	1875	2.00
40	Daly, S. L.	Utah	3,000,000	150,000	20	*	.....	.....	.....	1,837,500	Feb.	1891	.25
41	Deer Creek, S. G.	Idaho	1,000,000	200,000	5	*	.....	.....	.....	20,000	June	1889	.05
42	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*	.....	.....	.....	$1,000,000	Nov.	1887	.10
43	Derbec B. Grav., G. S.	Cal.	10,000,000	100,000	100	90,000	Dec.	1881	.10	240,000	Oct.	1890	.10
44	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*	.....	.....	.....	390,000	Oct.	1889	.05
45	Dunstone, G. S. L.	Mont.	1,000,000	200,000	5	*	.....	.....	.....	6,000	Nov.	1888	.03
46	Eclipse.	Colo.	100,000	100,000	1	*	.....	.....	.....	20,000	Nov.	1887	.10
47	Elkhorn, S.	Mont.	2,000,000	200,000	10	*	.....	.....	.....	196,875	Dec.	1890	.50
48	Empire Lt., G.	Mont.	500,000	100,000	5	.....	.....	.....	.....	70,500	Oct.	1887	.37½
49	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	550,000	June	1889	.50	4,892,500	Oct.	1890	.25
50	Evening Star, S. L.	Colo.	500,000	50,000	10	*	.....	.....	.....	1,458,000	Dec.	1889	.25
51	Excelsior, G.	Cal.	10,000,000	100,000	100	580,000	Sept.	1885	1.00	875,000	Oct.	1880	.25
52	Father de Smet, G.	Dak.	10,000,000	100,000	100	200,000	Nov.	1878	1.00	1,125,000	Dec.	1885	.20
53	Franklin, C.	Mich.	1,000,000	40,000	25	220,000	June	1871	.....	960,000	Jan.	1890	2.00
54	Freeland, G. S. C.	Colo.	5,000,000	200,000	25	*	.....	.....	.....	190,000	July	1886	.10
55	Garfield Lt., G. S.	Nev.	500,000	100,000	5	.....	.....	.....	.....	95,000	April	1888	.12½
56	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	3,988,800	Sept.	1890	.25	2,826,000	Oct.	1870	10.00
57	Grand Prize, S.	Nev.	10,000,000	100,000	100	785,000	Jan.	1890	.30	525,000	Jan.	1890	.30
58	Granite, S. L.	Idaho	500,000	500,000	1	*	.....	.....	.....	28,400	Oct.	1889	.02
59	Granite Mountain, S.	Mont.	10,000,000	400,000	25	*	.....	.....	.....	10,640,000	Feb.	1891	.50
60	Green Mountain, G.	Colo.	1,250,000	125,000	10	.....	.....	.....	.....	212,000	Nov.	1881	.07½
61	Hale & Norcross, G. S.	Nev.	11,200,000	112,000	100	5,142,800	April	1890	.50	1,162,000	July	1888	.50
62	Hecla Con., S. G. L. C.	Mont.	1,500,000	30,000	50	*	.....	.....	.....	1,500,000	April	1889	.50
63	Hel'a Mg. & Red, G. S. L.	Mont.	3,315,000	663,000	5	*	.....	.....	.....	197,979	July	1886	.06
64	Holmes, S.	Nev.	10,000,000	100,000	100	370,000	May	1890	.25	75,000	April	1886	.25
65	Holyoke, G.	Colo.	200,000	200,000	1	*	.....	.....	.....	27,000	Feb.	1883	.10
66	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	4,656,250	Feb.	1891	.10
67	Honorine, S. L.	Utah	500,000	250,000	2	37,500	April	1889	.05	125,000	Sept.	1887	.05
68	Hope, S.	Mont.	1,000,000	100,000	10	*	.....	.....	.....	233,252	April	1888	.25
69	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*	.....	.....	.....	4,200,000	Sept.	1890	.12½
70	Hubert, G.	Colo.	1,000,000	1,000,000	1	*	.....	.....	.....	247,000	Dec.	1889	.00½
71	Idaho, G.	Cal.	310,000	3,100	100	.....	.....	.....	.....	5,271,200	Jan.	1891	2.00
72	Ideal, S. L.	Colo.	1,500,000	50,000	10	.....	.....	.....	.....	15,000	Oct.	1886	.05
73	Illinois, S.	N. M.	100,000	100,000	1	*	.....	.....	.....	45,000	April	1889	.20
74	Independence, S.	Nev.	10,000,000	100,000	100	340,000	Oct.	1886	.20	225,000	Sept.	1879	.25
75	Iron Hill, S.	Dak.	2,500,000	250,000	10	134,000	July	1889	.03	156,250	Nov.	1887	.07½
76	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	*	.....	.....	.....	2,500,000	April	1889	.20
77	Jackson, G. S.	Nev.	5,000,000	50,000	100	237,500	Nov.	1880	.20	60,000	Jan.	1891	.10
78	Jay Gould.	Mont.	2,000,000	40,000	5	*	.....	.....	.....	459,000	May	1890	.04
79	Jocusitta, L.	Mex.	2,500,000	250,000	10	.....	.....	.....	.....	1,200,000	Feb.	1885	.50
80	Jumbo, G.	Colo.	2,000,000	200,000	10	.....	.....	.....	.....	35,000	Oct.	1887	.02½
81	Kearsarge, C.	Mich.	1,250,000	50,000	25	190,000	Oct.	1887	1.00	100,000	Jan.	1890	2.00
82	Kentuck.	Nev.	3,000,000	30,000	100	406,930	Aug.	1890	.30	1,350,000	Dec.	1886	.10
83	La Platta, S. L.	Colo.	2,000,000	200,000	10	*	.....	.....	.....	610,000	Sept.	1882	.30
84	Leadville Con., S. L.	Colo.	4,000,000	400,000	10	*	.....	.....	.....	4,423,000	April	1889	.05
85	Lexington, G. S.	Mont.	4,000,000	40,000	100	*	.....	.....	.....	609,000	Jan.	1885	2.00
86	Little Chief, S. L.	Colo.	10,000,000	200,000	50	*	.....	.....	.....	820,000	Dec.	1890	.05
87	Little Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*	.....	.....	.....	1,050,000	Mar.	1890	.50
88	Little Rule.	Colo.	500,000	500,000	1	.....	.....	.....	.....	110,000	Jan.	1891	.02
89	Mammoth.	Utah	10,000,000	400,000	25	110,000	.....	1882	.25	760,000	Jan.	1890	.10
90	Martin White, S.	Nev.	10,000,000	100,000	100	1,225,000	Oct.	1890	.25	140,000	Dec.	1886	.25
91	Mary Murphy, G. S.	Colo.	350,000	3,500	100	*	.....	.....	.....	175,000	May	1888	5.00
92	Matchless, S.	Colo.	500,000	500,000	1	.....	.....	.....	.....	15,000	Feb.	1890	.00½
93	May Mazeppa.	Colo.	1,000,000	100,000	1	.....	.....	.....	.....	95,300	Feb.	1891	.01¼
94	Minnesotta, C.	Mich.	1,000,000	40,000	25	420,000	April	1886	1.00	1,820,000	Mar.	1876	.....
95	Mono, G.	Cal.	5,000,000	50,000	100	76,000	Sept.	1890	.25	12,500	Mar.	1886	.25
96	Montana, Lt., G. S.	Mont.	3,300,000	660,000	5	*	.....	.....	.....	2,538,275	Jan.	1891	.06
97	Morning Star, S. L.	Colo.	1,000,000	100,000	10	*	.....	.....	.....	850,000	Dec.	1889	.20
98	Moulton, S.	Mont.	2,000,000	40,000	50	*	.....	.....	.....	380,000	Dec.	1887	.07½
99	Mount Pleasant, G.	Cal.	150,000	150,000	1	*	.....	.....	.....	150,000	Feb.	1887	.30
100	Mt. Diablo, S.	Nev.	5,000,000	50,000	100	137,500	June	1880	2.00	160,000	Oct.	1889	.20
101	Napa, Q.	Cal.	700,000	100,000	7	.....	.....	.....	.....	400,000	Jan.	1891	.10
102	Navajo, G. S.	Nev.	10,000,000	100,000	100	500,000	April	1890	.15	365,000	April	1889	.10
103	New Guston, S.	Colo.	500,000	100,000	5	*	.....	.....	.....	337,500	April	1890	.50
104	N. Hoover Hill, G. S.	N. C.	350,000	12,500	2½	*	.....	.....	.....	30,000	Dec.	1885	.06⅔
105	Northern Belle, S.	Nev.	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	April	1883	.50
106	North Belle Isle, S.	Nev.	10,000,000	100,000	100	395,000	April	1890	.20	230,000	May	1888	.50
107	North Star, G.	Cal.	1,000,000	100,000	10	.....	.....	.....	.....	250,000	Dec.	1889	.50
108	Ontario, S. L.	Utah	15,000,000	150,000	100	.....	.....	.....	.....	11,675,000	Feb.	1891	.50
109	Ophir, G. S.	Nev.	10,000,000	100,000	100	4,210,640	April	1890	.50	1,585,800	July	1892	1.00
110	Original, S. C.	Mont.	1,500,000	60,000	25	*	.....	.....	.....	125,000	July	1888	.05
111	Oro.	Colo.	500,000	100,000	5	.....	.....	.....	.....	60,000	June	1890	.20
112	Osceola, C.	Mich.	1,250,000	50,000	25	480,000	April	1876	1.60	1,447,500	Dec.	1890	1.50
113	Oxford, G.	N. S.	125,000	125,000	1	*	.....	.....	.....	78,500	Sept.	1888	.02
114	Paradise Valley, G. S.	Nev.	10,000,000	100,000	100	57,000	April	1888	.15	150,000	April	1887	.10
115	Parrot, C.	Mont.	1,800,000	180,000	10	.....	.....	.....	.....	786,000	Feb.	1891	.10
116	Peacock, S. G. C.	N. M.	2,000,000	200,000	10	*	.....	.....	.....	60,000	Nov.	1886	.....
117	Plumas Eureka, G.	Cal.	1,400,000	140,000	10	*	.....	.....	.....	2,540,000	Oct.	1889	.07½
118	Plutus, G. S. L.	Colo.	2,000,000	200,000	10	*	.....	.....	.....	20,000	Feb.	1886	.10
119	Plymouth Con., G.	Cal.	5,000,000	100,000	50	*	.....	.....	.....	2,280,000	Feb.	1888	.40
120	Quicksilver, pref., Q.	Cal.	4,300,000	43,000	100	.....	.....	.....	.....	1,705,791	Aug.	1890	1.50
121	" com., Q.	Cal.	5,700,000	57,000	100	.....	.....	.....	.....	643,867	July	1882	.40
122	Quincy, C.	Mich.	1,000,000	40,000	25	200,000	Dec.	1862	.....	5,770,000	Feb.	1891	5.00
123	Republic, C.	Mich.	5,000,000	100,000	50	400,000	Dec.	1889	.30	4,122,587	June	1887	1.25
124	Richmond, S. L.	Nev.	1,350,000	54,000	25	*	.....	.....	.....	99,785	Feb.	1890	.50
125	Ridge, C.	Mich.	500,000	21,000	25	219,939	Mar.	1886	.50	585,000	Mar.	1886	.05
126	Robinson Con., S. L.	Colo.	10,000,000	200,000	50	*	.....	.....	.....	100,000	Dec.	1882	.50
127	Robert E. Lee, S. L.	Colo.	10,000,000	500,000	20	.....	.....	.....	.....	4,460,000	July	1869	3.00
128	Savage, S.	Nev.	11,200,000	112,000	100	6,604,000	Nov.	1889	.50	7,500	April	1883	.01
129	Snosuone, G.	Idaho	150,000	150,000	.....	.....	.....	.....	.....	1,568,145	April	1888	.12½
130	Sierra Buttes, G.	Cal.	2,225,000	122,500	10	.....	.....	.....	.....	102,000	Jan.	1871	1.00
131	Sierra Nevada, G. S.	Nev.	10,000,000	100,000	100	6,296,910	May	1890	.50	270,000	April	1889	.10
132	Sierra Nevada, S. L.	Idaho	1,000,000	1,000,000	1	*	.....	.....	.....	40,000	May	1889	.02
133	Silver Cord, G. S. L.	Colo.	4,500,000	450,000	10	.....	.....	.....	.....	270,000	April	1889	.10
134	Silver King, S.	Ariz.	10,000,000	100,000	100	130,000	Nov.	1890	.30	1,950,000	July	1887	.25
135	Silver Mg. of L. V.	N. M.	500,000	500,000	1	*	.....	.....	.....	350,000	Feb.	1891	.10
136	Silverton, G. S. L.	Colo.	2,000,000	200,000	10	*	.....	.....	.....	50,000	Jan.	1881	.25
137	Small Hopes Con., S.	Colo.	5,000,000	250,000	20	*	.....	.....	.....	3,162,500	Oct.	1890	.10
138	Spring Valley, G.	Cal.	200,000	200,000	1	50,000	Oct.	1886	.25	3,695,000	June	1888	.06
139	Standard, G. S.	Cal.	10,000,000	100,000	100	100,000	June	1890	.50	155,000	Nov.	1881	.05
140	Stormont, S.	Utah	500,000	500,000	1	*	.....	.....	.....	844,000	Dec.	1887	.20
141	St. Joseph, L.	Mo.	1,500,000	150,000	10	*	.....	.....	.....	1,974,000	Dec.	1890	.02
142	Swansea, G.	Colo.	600,000	60,000	10	*	.....	.....	.....	600,000	Nov.	1891	.20
143	Tamarack, C.	Mich.	1,250,000	50,000	25	520,000	April	1885	3.00	1,670,000	Oct.	1890	4.00
144	Tombstone, G. S. L.	Ariz.	12,500,000	500,000	25	*	.....	.....	.....	1,250,005	April	1882	.10
145	United Verde, C.	Ariz.	3,000,000	300,000	10	*	.....	.....	.....	97,500	Feb.	1884	.10
146	Valencia M.	N. H.	150,000	1,500	100	*	.....	.....	.....	41,250	April	1886	2.50
147	Viola Lt., S. L.	Idaho	750,000	150,000	5	.....	.....	.....	.....	272,500	Oct.	1887	.37½
148	Ward Con., S. L.	Colo.	2,000,000	200,000	10	.....	.....	.....	.....	20,000	Dec.	1889	.05
149	Yankee Girl.	Colo.	2,500,000	250,000	10	.....	.....	.....	.....	1,275,000	July	1887	.10
150	Yellow Jacket, G. S.	Nev.	12,000,000	120,000	100	5,508,000	Mar.	1889	.50	2,148,000	Aug.	1871	1.50
151	Yeeb City, L. Z.	Mo	55,000	11,000	5	.....	.....	.....	.....	4,400	July	1889	.10
152	Woodside.	Utah	.....	.....	.....	.....	.....	.....	.....	25,000	Oct.	1889	.25
153	Young America.	Cal.	.....	.....	.....	.....	.....	.....	.....	175,000	.....	1889	.10

NON-DIVIDEND PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and am't of last.
1	Agassiz Cons., S. L.	Colo.	$2,500,000	50,000	$50	*	.....
2	Allegheny, S.	Colo.	5,000,000	500,000	10	.....	.....
3	Allouez, C.	Mich.	2,000,000	80,000	25	$737,000	Jan. 1890 .70
4	Alpha Con., G. S.	Nev.	3,000,000	30,000	100	112,500	Sept. 1890 .25
5	Alta, S.	Nev.	10,080,000	100,800	100	3,359,800	Sept. 1890 .50
6	Amador, G.	Cal.	400,000	200,000	2	*	.....
7	American Flag, S.	Colo.	1,250,000	125,000	10	300,000	June 1887 .....
8	Amity, S.	Colo.	250,000	250,000	1	.....	.....
9	Anglo-Montana, Lt.	Mont.	600,000	120,000	5	.....	.....
10	Astoria, G.	Cal.	200,000	100,000	2	.....	.....
11	Barcelona, G.	Nev.	5,000,000	200,000	25	*	.....
12	Bechtel Con., G.	Cal.	10,000,000	100,000	100	173,500	Jan. 1883 .10
13	Belmont, S.	Nev.	5,000,000	50,000	100	735,000	April 1886 .10
14	Best & Belcher, G. S.	Nev.	10,080,000	100,800	100	2,279,275	Aug. 1890 .25
15	Big Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*	.....
16	Black Oak, G.	Cal.	3,000,000	300,000	10	*	.....
17	Boston Con., G.	Cal.	10,000,000	100,000	100	170,000	Nov. 1883 .25
18	Bremen, S.	N. M.	5,000,000	500,000	10	*	.....
19	Brownlow, S.	Colo.	250,000	250,000	1	.....	.....
20	Brunswick, G.	Cal.	2,000,000	400,000	5	*	.....
21	Bullion, G. S.	Nev.	10,000,000	100,000	100	2,700,000	Dec. 1889 .25
22	Butte & Boston, C. S.	Mont.	5,000,000	200,000	.....	.....	..... .25
23	Calaveras, G.	Cal.	500,000	500,000	1	*	.....
24	Carisa, G.	Wy.	500,000	100,000	5	*	.....
25	Carupano, G. S. L. C.	Ven.	200,000	100,000	2	*	.....
26	Cashier, G. S.	Colo.	500,000	250,000	2	*	.....
27	Charles Dickens, G. S.	Idaho	1,250,000	250,000	5	*	.....
28	Cherokee, G.	Cal.	1,500,000	150,000	10	.....	.....
29	Chollar, S.	Nev.	11,200,000	112,000	100	1,540,000	Nov. 1889 .50
30	Cleveland, T.	Dak.	1,000,000	500,000	2	*	.....
31	Colchis.	N. M.	500,000	50,000	10	.....	.....
32	Comstock, G. S.	Nev.	10,000,000	100,000	100	35,000	Mar. 1887 .15
33	Con. Imperial, G. S.	Nev.	5,000,000	50,000	100	1,875,000	July. 1890 .05
34	Con. Pacific, G.	Cal.	6,000,000	60,000	100	198,000	June 1890 .10
35	Con. Silver, S.	Mo.	2,500,000	250,000	10	.....	.....
36	Crescent, S. L.	Colo.	3,000,000	300,000	10	*	.....
37	Crocker, S.	Ariz.	10,000,000	100,000	100	150,000	June 1890 .15
38	Crowell, G.	N. C.	500,000	500,000	1	.....	.....
39	Dahlonega, G.	Ga.	250,000	250,000	1	*	.....
40	Dandy, S.	Colo.	5,000,000	500,000	10	.....	.....
41	Decatur, C.	Colo.	1,500,000	300,000	5	*	.....
42	Denver City, S. L.	Colo.	5,000,000	500,000	10	*	.....
43	Denver Gold, G.	Colo.	300,000	60,000	5	.....	.....
44	Durango, G.	Colo.	500,000	500,000	1	*	.....
45	Eastern Dev. Co., Lt.	N. S.	1,500,000	150,000	10	950,000	Mar. 1886 1.00
46	El Cristo, G. S.	U.S.C.	1,000,000	500,000	2	.....	.....
47	El Dorado, G.	Cal.	1,000,000	250,000	4	*	.....
48	El Talento, G.	U.S.C.	1,000,000	500,000	2	.....	.....
49	Empire, S.	Utah	10,000,000	100,000	100	.....	.....
50	Eureka Tunnel, S. L.	Nev.	10,000,000	100,000	100	*	.....
51	Exchequer.	Nev.	10,000,000	100,000	100	365,000	July. 1890 .25
52	Found Treasure, G. S.	Nev.	10,000,000	100,000	100	81,500	May. 1890 .25
53	Gogebic, L. Sup., L.	Wis.	5,000,000	200,000	25	.....	.....
54	Gold Cup, S.	Colo.	500,000	500,000	1	*	.....
55	Golden Era, S.	Mont.	2,000,000	200,000	10	*	.....
56	Gold Placer, G.	Colo.	5,000,000	200,000	25	229,314	Dec. 1885 .25
57	Gold Rock, G.	Cal.	1,000,000	500,000	2	*	.....
58	Goodshaw, G.	Cal.	10,000,000	100,000	100	*	.....
59	Grand Prize, C.	Cal.	12,000,000	120,000	100	.....	.....
60	Grand Duke.	Colo.	800,000	80,000	10	.....	.....
61	Great Remance, G.	U.S.C.	1,000,000	500,000	2	*	.....
62	Gregory-Bobtail, G.	Colo.	550,000	550,000	1	*	.....
63	Gregory Con., G.	Mont.	3,000,000	300,000	10	.....	.....
64	Harlem M. & M. Co., G.	Cal.	1,000,000	200,000	5	.....	.....
65	Head Cent. & Tr., S. G.	Ariz.	10,000,000	100,000	100	.....	.....
66	Hector, G.	Cal.	1,500,000	300,000	5	45,000	Jan. 1889 .15
67	Highland, C.	Mich.	500,000	25,000	20	.....	.....
68	Holywood.	Cal.	200,000	100,000	2	.....	.....
69	Hortense, S.	Colo.	2,000,000	200,000	10	.....	.....
70	Huron, C.	Mich.	1,000,000	40,000	25	280,000	May 1887 3.00
71	Iron, Gold & Silver, S.	N. M.	2,000,000	200,000	10	*	.....
72	Ironton, L.	Wis.	1,000,000	40,000	25	.....	.....
73	Iroquois, C.	Mich.	1,250,000	50,000	25	.....	.....
74	J. D. Reymert.	Ariz.	10,000,000	100,000	100	.....	.....
75	Julia Con., G. S.	Nev.	11,000,000	110,000	100	1,463,000	Jan. 1889 .10
76	Lacrosse, G.	Colo.	1,000,000	100,000	10	*	.....
77	Lee Basin, S. L.	Colo.	5,000,000	500,000	10	*	.....
78	Mayflower Gravel.	Dak.	1,000,000	100,000	10	585,000	Mar. 1890 .56
79	Medora, G.	Dak.	250,000	250,000	1	.....	.....
80	Mexican, G. S.	Nev.	10,000,000	100,000	100	2,791,963	Oct. 1890 .25
81	Middle Bar, G.	Cal.	400,000	200,000	2	*	.....
82	Mike & Starr, S. L.	Colo.	1,000,000	200,000	5	*	.....
83	Mollie Gibson	Colo.	2,000,000	100,000	2	.....	.....
84	Monitor, G.	Colo.	100,000	1,000,000	1	*	.....
85	Mutual Mg. & Sm.	Wash.	100,000	1,000	100	*	.....
86	Native, C.	Mich.	1,000,000	40,000	25	.....	.....
87	Neath, G.	Colo.	1,000,000

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Feb. 14.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		Feb. 20.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adams													
Alice													
Aspen, Colo											6.25	6.00	150
Atlantic, Mich													
Belcher, Nev													
Bodie Cons., Cal	1.35												200
Bos. & Mont., Mont													
Breece, Colo													
Bulwer, Cal							.46	.40			.49		200
Caledonia							.65						800
Calumet & Hecla, Mich													
Catalpa, Colo													
Chrysolite, Colo													
Colorado Cen.,Con.,Colo													
Cons. Cal. & Va., Nev													
Crown Point, Nev	1.90		1.80		1.80				1.75				600
Deadwood, Dak													
Dunkin, Colo													
Excelsior, Cal													
Father de Smet													
Franklin													
Freeland, Colo													
Gould & Curry, Nev					2.10				2.25				200
Hale & Norcross, Nev	2.25												100
Holyoke			.03										100
Homestake, Dak													
Horn-Silver, Utah			3.15				3.05		3.15				800
Independence, Nev													
Iron Hill, Dak													
Kearsarge													
Leadville C., Colo	.12						.11		.11				3,600
Little Chief, Colo					.54		.34						200
Mono, Cal													
Moulton, Mont													
Mt. Diablo, Nev													
Navajo, Nev													
N. Belle Isle, Nev													
Ontario, Utah													
Ophir, Nev	1.40												200
Osceola, Mich													
Plymouth, Cal	2.25						2.00						300
Quicksilver, Pref													
" Com													
Quincy, Mich													
Robinson Cons., Colo													
Savage	2.25												100
Sierra Nevada, Nev			2.30										200
Silver Cord													
Silver King, Ariz													
Silver Mg. of L. V													
Small Hopes													
Standard													
Stormont, Utah													
Tamarack, Mich							110						10
Yellow Jacket, Nev	2.35		2.45		2.45				2.25				400

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Feb. 14.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		Feb. 20.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alpha, Nev													
Alta, Nev	.70		.80		.70		.70						600
American Flag, Colo													
Andes, Nev			1.20		2.30								300
Amador, Cal													
Astoria, Cal	.03		.04						.04		.04		4,200
Belmont, Cal	.35								.45		.35		300
Best & Belcher, Nev					2.25				2.60				200
Bonanza King, Cal													
Brunswick, Cal	.15	.13	.14		.12	.11					.11	.10	3,300
Bullion, Nev													
Butte & Bost., Mont													
Castle Creek, Idaho													
Challar, Nev	2.15				2.25				2.35				300
Col. & Beaver, Idaho					.03								100
Commonwealth, Nev													
Comstock T., Nev			.16										200
" bonds									.35				2,000
" scrip													
Con. Imperial, Nev													
Cons. Pacific, Cal													
Crescent, Colo													
Del Monte, Nev													
El Cristo, Rep. of Col			.50	.49							.39		400
Exchequer													
Hollywood, Cal													
Huron, Mich													
Julia, Nev					.27								1,000
Justice, Nev													
King. & Pembroke													
Lacrosse, Colo													
Lee Basin, Colo													
Mexican, Nev	2.50		2.70						2.60				300
Middle Bar	.04		.04								.04		1,900
Monitor, Colo													
Mutual Sm. & Mg. Co	1.50		1.50		1.35		1.45		1.50		1.50		1,400
Nevada Queen, Nev													
N. Commonwealth, Nev													
Occidental, Nev			.90										200
Oriental & Mil., Nev													
Overman, Nev													
Phœnix of Ariz	.60	.50	.55		.60		.50				.57	.53	2,800
Phœnix Lead, Colo													
Potosi													
Rappahannock													
S. Sebastian													
Scorpion					.33								300
Seg Belcher, Nev			1.30										200
Silver Queen													
Sullivan Con., Dak													
Sutro Tunnel, Nev													
Tioga, Cal													
Union Cons., Nev	2.35												100
Utah, Nev	.80				.70		.65		.80				700

*Ex dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 8,060. Non-dividend shares sold, 20,800. Total, New York, 28,860.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	Feb. 13.		Feb. 14.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		SALES.
Atlantic, Mich	15.50						15.00		15.50	15.00			204
Bodie, Cal													
Bonanza Development					.62½		.62½						640
Bost. & Mont., Mont	42.25	41.50					41.00		41.75	41.00	41.63	41.50	657
Breece, Colo													
Calumet & Hecla, Mich	360						360		360				14
Catalpa, Colo													
Central, Mich													
Chrysolite Colo													
Con. Cal. & Va., Nev													
Dunkin, Colo													
Eureka, Nev													
Franklin, Mich	17.00						17.13						125
Honorine, Utah									.30				300
Horn Silver, Utah													
Kearsarge	13.00	12.25					12.00	11.25			12.00		765
Little Chief, Colo													
Little Pittsburg, Colo													
Moulton													
Napa, Cal													
Ontario, Utah													
Osceola, Mich	37.25	37.00					37.50	37.00	37.00	36.50			250
Quincy, Mich					91.50								25
Ridge, Mich													
Sierra Nevada, Nev													
Silver King													
Stormont, Utah													
Tamarack, Mich	145						145		145				81
Tecumseh, Mich													

NAME OF COMPANY.	Feb. 13.		Feb. 14.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		SALES.
Allouez, Mich	3.25	2.50			2.63	2.50	2.63	2.50	2.50		2.50		3,356
Arnold, Mich													
Aztec, Mich													
Brunswick, Cal													
Butte & Boston, Mont	16.50	15.75			16.00	15.75	15.88		16.00	15.50	15.63		677
Centennial, Mich	16.50	15.50					16.50	15.50	16.00	15.50			395
Comstock, T., Nev													
Copper Falls Mg													
Crescent, Colo													
Dana, Mich													
Don Enrique, N. M													
El Cristo, S. A													
Hanover, Mich													
Humboldt, Mich													
Hungarian, Mich													
Huron, Mich													
Mesnard, Mich													
National, Mich					3.50								100
Native, Mich													
Oriental & M., Nev													
Phœnix													
Pontiac													
Rappahannock, Va													
Santa Fe, N. Mex	.55				.62½	.57½			.57½		.55		4,600
Shoshone, Idaho													
South Side, Mich													
Star													
Washington, Mich													
Winthrop, Mich													

Boston: Dividend shares sold, 3,021. Non-dividend shares sold, 9,128. Total Boston, 12,149.

COAL STOCKS.

NAME OF COMPANY.	Par val. of shares.	Feb. 14.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		Feb. 20.		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American Coal														
Cambria Iron														
Cameron Coal & I. Co														
Ches. & O. RR	100													
Chic. & Ind. Coal RR	100													
Do. pref	100													
Col. C. & I	100					37		37					36½	200
Col. & Hocking C. I	100													
Consolidation Coal	100													
Del. & H. C	100	137¾						138	137¼	137⅝	137	137¾	137⅝	1,010
D., L. & W. RR	50	138⅜	138			138¾	138⅝	139½	139	138¼	138¼	138⅝	138½	10,918
Hocking Valley	100	27	26¾			27		26¼		26				510
Hunt. & Broad Top														
Do. pref								45¾						155
Illinois C. & Coke Co														
Lehigh C. & N	50	48⅜				48¼	48⅛	48⅜	48¾	48¼	48			1,223
Lehigh Valley RR	50	50	49⅞			50	49⅞	50	49⅞	50				893
Lehigh & Wilk. Coal	100													
Mahoning Coal	100													
Do. pref	100													
Maryland Coal		16												400
Morris & Essex	100													
New Central Coal	50													
N. J. C. RR	100	116½				118¼	117½	118		116				835
N. Y. & S. Coal	100													
N. Y., Susq. & West	100	10¾	10	11	10	11¼	10¾	11¼	10⅝	11⅛	10¾	11	10⅝	10,938
Do. pref	100	39½	37½	39	38	39	38	40¼	38¾	39	34⅞	38½		9,404
N. Y. & Perry C. & I	100													
Norfolk & West. RR.	50													
Do. pref	50													
Penn. Coal	50			56¼	55¾									700
Penn. RR	50	51⅝		51¾	51⅝	51⅝	51½	51½						1,753
Ph. & R. RR				33	32⅞	33⅛	33	32½	31⅞					**5,636
Sunday Creek Coal														
Do. pref	100													
Tennessee C. & I. Co		36½		36½	35½									310
Do. pref		86												100
Westmoreland Coal														

**Sales in New York, 1,400; in Philadelphia, 5,236. Total sales, 46,095.

San Francisco Mining Stock Quotations.

COMPANY.	CLOSING QUOTATIONS.					
	Feb 13.	Feb. 14.	Feb. 16.	Feb. 17.	Feb. 18.	Feb. 19.
Alpha						
Alta	.60			.60	.60	.65
Belcher						
Belle Isle	.45			60	.50	.65
Best & Bel	2.40			2.40	2.50	1.65
Bodie	1.30			1.35	1.30	1.40
Bulwer	.35			.55	.45	.50
Challar	2.05			2.10	2.15	2.10
Com'wealth	.70			.70	.70	.70
Con. C. & V	4.40			4.60	4.75	5.00
Con Pacific						
Crown Point	1.70			1.55	1.60	1.60
Del M'te, Nev						
Eureka C				3.00		3.00
Gould & C	2.05			2.10	2.10	2 05
Hale & N	2.20			2.15	2.20	2.25
M. White						
Mexican	2.40			2.35	2.50	2.60
Mono	.65			.70	.65	.70
Mt. Diablo						
Navajo	.20			.20	.20	.20
Nev. Queen				.20	.25	.25
N. Belle Isle	.20				.50	.50
N. Com'w'lth					.50	
Ophir	3.25			3.20	3.40	3.70
Potosi	4.25			4.50	4.40	4.50
Savage	2.10			2.05	2.20	2.20
Sierra Nev	2.20			2.70	2.20	2.30
Union Con	2.25			2.35	2.35	2.35
Utah	.70			.70	.70	.75
Yellow Jak	2.25			2.10	2.15	2.20

STOCK MARKET QUOTATIONS.

Baltimore, Md.

COMPANY.	Bid. L. H.	Asked. L. H.
Atlantic Coal	.90	$1.50
Balt. & N. C.	.10	.14
Big Vein Coal	....	1.10
Conrad Hill	....	.10
Cons. Coal	....	.25
Diamond Tunnel	....	....
George's Crk. C.	1.10	1.15
Lake Chrome	.13	....
Maryland & Charlotte	....	....
North State	....	....
Silver Valley	.65	.80

Prices bid and asked, lowest and highest, during the week ending February 19.

Birmingham, Ala. Feb. 17.

COMPANY.	Bid. L. H.	Asked L. H.
Ala. Coal & I. Co.	....	$100
Ala. Conn. C. & C. Co.	....	$23
Ala. R. Mill Co.	$100	....
*Alice Furnace	$100	....
Anna Howe G. Mg. Co.	$⅛	$⅜
Bessemer Land	$29	$30
Bir. Mg. & Mfg.	....	$35
Cahaba Coal Mg. Co.	....	$61
Camille Gold Mg. Co.	$½	....
De Bardeleben C. & I. Co.	$3¾	....
Decat. L. Imp.	$3¾	$9⅛
Decatur Min. L.	....	$19
Ensley Land	$7¼	$7½
*Eureka	....	....
Florence L. & Mg. Co.	....	$18¼
Gadsen Land	$3⅝	$3¾
Hecla Coal Co.	....	....
Hen. S. & M. Co.	$3	$4½
Jagger-Townl'y C. & C. Co.	$8½	$10
Mag-Ellen	$100	....
Mary Lee C. & R. Co.	....	$75
Sheffield C. & I. Co.	$52½	$55
Sloss I. & S.	$18	$22
†Sloss I. & S.	$85	$87
‡‡ Sloss I. & S.	$49	$52½
Tuscaloose C. I. & L. Co.	....	$24
Ten. C. & I. Co.	$36	$37
" pref.	$86	$88
Vulcan C. & C. Co.	$5	....
Woodstock I. Co.	....	$30

* Bonds. † First mortgage. ‡‡ Second mortgage. ** Without interest.

Pittsburg, Pa. Feb. 19.

COMPANY.	B.	A.	Closing.
Allegheny Gas Co.	$.....	$.....	$.
Bridgewater Gas Co.	45.00	.....	45.00
Chartiers Val. Gas	.....	10.00	10.00
Columbia Oil Co.	1.00	3.00	1.00
Consignee Mg. Co.	.20	.50	.20
Consolidated Gas Co.	.....	.....	.....
East End E. Light Co.	.....	.....	.....
East End Gas Co	.....	.....	.....
Forest Oil	.....	.....	.....
Hazlewood Oil Co.	.....	.....	.....
La Noria Mining	.20	.27	.21
Luster Mg. Co.	20.00	21.25	21.25
Mansfield C. & C. Co.	.....	.....	.....
Manuf'turers Gas Co.	20.00	25.00	.....
Nat. Gas Co. of W. Va	.....	60 00	60.00
N. Y. & Clev. Gas Coal	.....	.....	.....
Ohio Valley Gas	.....	.....	.....
Pennsylvania Gas	.....	.....	.....
People's Natural Gas	.....	.....	.....
People's N. G. & P. Co.	7.25	7.75	7.75
Philadelphia Co.	10.50	11.75	.....
Pine Run Gas Co.	.....	.....	.....
Pittsburg Gas	.....	.....	.....
Silverton Mg. Co.	1.00	2.00	2.00
Sterling Silver Mg. Co.	4.00	.....	4.00
South Side Gas	.....	.....	.....
Tuna Oil Co.	.....	60.00	60.00
Union Gas	.....	.....	.....
Washington Oil Co.	80.00	85.00	80.00
W'house Brake Co.	.....	.....	.....
W'house A. B. Co.	91.00	100.00	96.00
W'house E. Light.	7.88	13.88	13.88
W'moreland & Camb.	.....	.....	.....
Wheeling Gas	13.00	16.00	16.00
Yankee Girl Mg	.....	.....	.....

St. Louis. Feb. 18.

CLOSING PRICES.

COMPANY.	Bid.	Asked.
Adams, Colo.	$	$2.10
American & Nettie	.11¼	.50
Aztec, N. Mex.	.08	.....
Bi-Metallic	.....	.....
Central Silver	.06½	.07½
Cleveland, Colo.	.....	.....
Cleveland & An'r.	.....	.....
Coeur d'Alene	.....	.....
Elizabeth	2.60	2.75
Gold King	.08	.10½
Granite Mountain, Mont.	.....	.....
Hope	.....	.....
Ingram	.....	.....
I. X. L., Colo.	.....	.....
La Union	.02	.02½
Little Albert	.15	.....
Montrose Placer, Colo.	.47½	.50
Major Budd, Mont.	.....	.....
Mexican Imp.	.....	.....
Mickey Breen	.75	.89
Mountain Key	.....	.....
Nellie	.....	.....
Old Colony	.....	.....
Pat Murphy, Colo.	.02½	.03½
Puzzle	.....	.....
Richmond Hill	.....	.....
Samoa	.....	.....
Silver Age, Colo.	1.40	1.50
Small Hopes, Colo.	.85	.....
Tourtelotte	.....	.....
West Granite, Mont.	.....	.....
Wire Patch	.13	.14½
Yuma, Ariz.	.46¼	.50

Trust Stocks. Feb. 20.

The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange:

CERTIFICATES.

Am. Cotton Oil. Com	$21¾@$22
" " " Pfd	47¾@ 48¼
" " " Tr. Repts	24 @ 24¼
Sugar Refineries, Tr. repts	84¼@ 84¾
Am. Sugar Refineries, Com.	73⅛@ 73½
" " " Pfd	86 @ 86½
Distillers' & Cattle Feeders'	43¾@ 44½
Linseed Oil	39½@ 40
Standard Oil	166 @168
National Lead	19¼@ 19⅜
Cattle Trust	....@ ....

Trust Receipts.

Sales at the New York Stock Exchange week ending Feb. 20:

	Sales.	Price H.	Price L.
*American Cotton Oil	6,701	21¼	21¾
National Lead	11,234	19⅜	19¼
*Sugar	4,762	87	84½

* Trust receipts.

Foreign Quotations.

	London. Highest.	Lowest.
COMPANY.		
Almada, Mex.	2s. 9d.	2s. 3d.
Amador, Cal.	8s. 6d.	6s. 6d.
Appalachian, N. C.	1½d.	1½d.
Canadian Phos., Can.	£½	£¼
Colorado, Colo.	3s.	2s. 6d.
Comstock, Utah.	....	....
Cordova	....	....
Cons. Esmeralda, Nev.	2s. 6d.	2s.
Denver Gold, Colo.	6d.	....
Dickens Custer, Idaho.	1s.	9d.
East Arevalo, Idaho.	2s.	1s.
El Callao, Venezuela	....	....
Elmore, Idaho	1s. 3d.	9d.
Garfield, Nev	1s.	9d.
Jay Hawk, Mont.	1s. 9d.	1s. 3d.
Josephine, Cal.	1s.	6d.
Kohinoor, Colo.	1s.	6d.
La Luz, Mex.	1s. 6d.	1s.
La Valera, Mex.	21s. 3d.	18s. 9d.
Montana Lt., Mont.	16s.	14s
New California, Colo.	5s. 3d.	4s. 9d.
New Consolidated	1s.	5d.
New Eberhardt, Nev.	1s. 3d.	9d.
New Emma, S., Utah.	2s. 9d.	2s. 3d.
Newfoundland, N. F.	3s. 6d.	3s.
N. Gold Hill, N. C.	2s. 3d.	1s. 9d.
New Guston, Colo.	£3	£2½
New Hoover Hill, N. C.	1s.	6d.
Old Lout, Colo.	....	....
Palmarejo, Mex.	9s. 6d.	8s. 6d.
Pinos Altos, Mex.	5s. 9d.	5s. 3d.
Pittsburg Cons., Nev.	7s. 9d.	7s. 3d.
Richmond Con., Nev.	£1½	£1¼
Ruby & Dunderb'g, Nev.	1s. 3d.	9d.
Sam Christian, N. C.	1s. 3d.	9d.
Sierra Buttes, Cal.	5s.	4s.
" Plumas Eur., Cal.	£⅝	£½
Sonora, Mex.	....	....
United Mexican, Mex.	6s. 6d.	5s.
U. S. Placer, Colo.	6d.	3d.
Viola Lt., Idaho	1s. 6d.	1s.
Yankee Girl, Colo.	17s. 6d.	16s. 6d.

	Paris. Francs.
Belmez, Spain	795.00
Callao, Venez	39.00
Callao Bis., Venez	13.75
East Oregon, Ore.	4.25
Forest Hill Divide, Cal.	....
Golden River, Cal.	1 0.00
" " parts	30.00
Lexington, Mont	110.00
" parts	3 00
Rio Tinto, Spain	580.00
Tharsis, Spain	157.00

CURRENT PRICES.

Those quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Acid—Acetic, ℔ 100 lbs. $1.75@$2.00
Muriatic, 18° ℔ 100 lbs .80@1.00
Muriatic, 20° ℔ 100 lbs .90@1.10
Muriatic, 22° ℔ 100 lbs .1.00@1.20
Nitric, 36° ℔ 100 lbs .4.00@4.29
Nitric, 42° ℔ 100 lbs .3.50@4.00
Oxalic, ℔ 100 lbs .6.50@10.50
Sulphuric, 60° ℔ 100 lbs .70@.80
Sulphuric, 66° ℔ 100 lbs .75@.90

Alkali—
Refined, 48 p. c. .1.60@1.65
Refined, 58° .1.55@1.90

Alum—Lump, ℔ lb .04
Ground, ℔ lb. .05
Lump ℔ ton, Liverpool .£4 17 6
Sulphate of Alumina, ℔ ton .£4 10

Ammonia—Sul., ℔ 100 lbs .3.15
Carb, ℔ lb. .7½@8½

Aqua Ammonia—18° ℔ lb. .4¾
20°, ℔ lb. .6
22°, ℔ lb. .6@7
26°, ℔ lb. .10@11

Ammoniates—Azotine, ℔ unit 1 95@ 2 06
Blood, dried, red, ℔ unit, west 1 80@ 1 00
low grade, ℔ unit 1 70@ 1 80
Concentrated tankage, ℔ unit 1 75@ 1 80
Bones, rough, ℔ ton .20 00@23 00
ground, ℔ ton .25 00@28 00
Bone black, refuse, ℔ ton .17 50@19 50
Kieserite .6 00@ 6 50
Fish guano, dried .18 50@19 00
acidulated .10 00@— 00
wet .8 50@ 9 50
Phosphate rock, f.o.b Char'n 6 00@ 7 25
undried —@ 6 —
dried 7 00@ 7 50
ground 8 00@11 50
Acid phosphate, 14% per unit. 72½@ 75

Arsenic—White, powdered ℔ lb. .3¼@3½
Red ℔ lb. .5¾@ ¾
White at Plymouth, ℔ ton .£12 2 6

Asbestos—Am., ℔ ton .$50@$300
Italian, ℔ ton, c. i. f. L'pool .£18@£60

Ashes—Pot, 1st sorts, ℔ lb. .4¾@4¾
Pearl .6¼@6½

Asphaltum—P. ton .13.00
Prime Cuban, ℔ lb. .4½@5½c.
Hard Cuban, P ton .$28.00
Trinidad, refined, ℔ ton .$30.00
Egyptian .8@9

Barium—Nitrate, ℔ lb. .8@8½

Barytes—Sulph., Am. prime white .17@20
Sulph., foreign, floated, ℔ ton. .19½@21.50
Sulph., off color, ℔ ton. .11.50@14.00
Carb., lump, f. o. b. L'pool, ton .£6
No. 1. Casks, Runcorn, " " .£4 10 0
No. 2, bags, Runcorn, " " 3 15 0

Bleach—Over 35 p. c., ℔ lb. .1.85@1.90

Borax—Refined, ℔ lb. .9½@9¾
Concentrated .7¾@8⅜
Refined " Liverpool ℔ ton .£29

Brimstone—*See Sulphur.*

Bromine—℔ lb. .37@38

Chalk—℔ ton .1.75
Precipitated, ℔ lb. .4¾@5

China Clay—English, ℔ ton 13.50@18.50
Southern, ℔ ton .13.50

Chrome Yellow—℔ lb. .10@2

Cobalt—Oxide, ℔ lb. .2.60@2.90

Copper—Sulph., English, Wks. ton £29@£21

Copperas—Common, ℔ 100 lbs. .70
Best, ℔ 100 lbs. .75@1.00
Liverpool, ℔ ton, in casks .£1 15s.

Corundum—Powdered, ℔ lb. .4½@.9

Cream of Tartar—Am. 99% .22½
Powdered, 99 p. c. .23

Emery—Grain, ℔ lb. .4½@5
Flour, ℔ lb. .2¾@3½

Feldspar—Ground, ℔ ton .15.00

Fuller's Earth—Lump, ℔ bbl. .90@95
Powdered, ℔ lb. .1¾@2

Gypsum—Calcined, ℔ bbl. .1.25@1.50

Iodine—Resublimed .2.75

Kainit—℔ ton .$9.75@$10

Kaolin—*See China Clay.*

Lead—Red, ℔ lb. .6¾@9
White, American, in oil, ℔ lb. .6¾@7¼
White, English, ℔ lb. .8½@8¾
Acetate, or sugar of, white .12@13
Nitrate .9@10

Lime Acetate—Amer. Brown .95@1.00
" Gray 1.75@1.87½

Litharge—Powdered, ℔ lb. .6½@6¾
English flake, ℔ lb. .9@9½

Magnesite—Greek, ℔ ton .20.00

Manganese—Crude, per unit .22@28
Oxide, ground, per lb. .2½@2½

Mercuric Chloride—(*Corrosive Sublimate*) ℔ lb. .70@72

Metallic Paint—Brown per ton. $20@25
Red .$20@25

Mineral Wool—℔ lb. .2

Mica—In sheets according to size.
1st quality, ℔ lb. .25@$6.00

Naphtha—Black .60

Ochre—Yellow, "B. F.," ℔ ton, f. o. b. mill .30.00
"J. F. L. S.," ℔ lb. ex dock .3½
Yellow .10@25
Rochelle .1.35@1.50
Washed Dutch .5@—
Washed French .1½@2½
Washed Nat Oxford, Lump .6½@6¾
Washed Nat Oxford, Powder .7@7½
Golden .3¾@4
Domestic .¾@1½
Domestic, for O. C. & W. P. .⅜@1

Oils, Mineral
Cylinder, light filtered .15@20
Dark filtered .14@21
Extra cold test —@—
Dark steam refined .10@18

Phosphate Rock—S. Carolina, per ton f. o. b. Charleston .6.00@7.25
Ground, ex vessel New York .11.00
Canadian Apatite, lump, f. o. b. at Montreal, ℔ ton .16.00

Phosphorus—℔ lb. .64@65
Precip., red .100@102
white .100@103

Plumbago—Ceylon, ℔ lb. .4@5
American, ℔ lb. .5@7

Potassium—Cyanide, ℔ lb. .39@40
Bromide, ℔ lb. .33
Chlorate, English, ℔ lb. .11@14
Chlorate, powdered .13@14
Carb, ℔ lb. .4.70@5.54
Caustic, ℔ lb. .7½@8
Iodide .2.65@2.70
Muriate, ℔ 100 lbs. .1.82½
Nitrate, refined, ℔ lb. .6@8
Bichromate, ℔ lb. .10½@11
Dble. m'ure salt, basis of 48@50% .1.07½
Sulphate, basis of 90% ℔ 100 lbs. .2.05
Yellow Prussiate .17½@18
Red Prussiate .42@45

Pumice Stone—Select lumps, lb. .3¼
Original cks., ℔ lb. .1¾@2
Powdered, pure, ℔ lb. .2¼@2½

Pyrites—Non-cupreous, p. units 10d.

Quartz—Ground, ℔ ton .14.00@16.00

Rotten Stone—Powdered, ℔ lb. .3¼@3½
Lump, ℔ lb. .0@10

Salt—Liverpool, ground, ℔ sack 75@80
Turk's Island, ℔ bush .25@28

Salt Cake—℔ lb. .70@75

Saltpeter—Crude, ℔ lb. .5¼@5½
Refined, ℔ lb. .6@8

Silex, ℔ ton .14@25

Soda—Carb Ash, 48% .1.60@1.65
" high test .1.55@1.60
Caustic ash, 48% .1.62½@1.65
" high test .1.60
Newcastle, 48% .— @ —
" high test .1.50@1.55
Bicarb, English .3.50@3.75
" American .3@3½
Crystal, carbonate .1.95@2.00
Caustic, 60% .3.40@3.50
" 70% .3.15@3.20
" 74% .3.15@3.20
" 77% .3.25@3.37½
Sal, English .1.17½@1.20
" American .1.10@1.15
Nitrate .1.80@1.85
Prussiate .17½@18
Phosphate .7@18
Stannate .8@15

Strontium—Nitrate, ℔ lb. .9@9½

Sulphur—Roll, ℔ lb. .1¾
Flour, ℔ lb. .20
Crude Brimstone, 2s., ℔ ton .27 00
Crude Brimstone, 3ds, ℔ ton .26.50

Sylvinit, 23@27%, S. F. P., per unit. 40@42½

Talc—Ground French, ℔ lb. .1¼@1½
Domestic, ℔ ton .$18@$20
c. i. f. Liverpool, ℔ ton .£4 5

Terra Alba—French .80@85
English .75@80
American, No. 1 .—@—
American, No. 2 .40@50

Tin—Crystals .15½@16
Muriate .8@ 3

Vermillion—American, ℔ lb. .61
English ℔ lb. .82@85

Vitriol—(Blue), Ordinary, ℔ lb. .5½@5¾
Extra, ℔ lb. .7

Zinc Oxide—Am., Dry, ℔ lb. .4½
Antwerp, Red Seal, ℔ lb. .6@6½
Paris, Red Seal, ℔ lb. .6½@7
* Spot.

THE RARER METALS.

Aluminum—(Metallic), per lb. $1.50@$2
Sheet, per lb .2.50

Arsenic—(Metallic), per lb. .40

Barium—(Metallic), per gram .4.00

Bismuth—(Metallic), per lb. .2.75

Cadmium—(Metallic), per lb. .1.00

Calcium—(Metallic), per gram .10.00

Cerium—(Metallic), per gram. .7.50

Chromium—(Metallic), per gram. 1.00

Cobalt—(Metallic), per lb. .6.00

Didymium—(Metallic), per gram. 9.00

Erbium—(Metallic), per gram .7.50

Gallium—(Metallic), per gram .140.00

Glucinum—(Metallic, per gram. 12.00

Indium—(Metallic), per gram. .9.00

Iridium—(Metallic), per oz. .7.00

Lanthanum—(Metallic), per gr. 10.00

Lithium—(Metallic), per gram .10.00

Magnesium Per lb. .4.50

Manganese—(Metallic), per lb. .1.10
Chem. pure, per oz. 10.00

Molybdenum—(Metallic), per gm .50

Niobium—(Metallic), per gram .5.00

Osmium—(Metallic), per oz. .65.00

Palladium—(Metallic), per oz. .35.00

Platinum—(Metallic), per oz. 20.00@25.00

Potassium—(Metallic), per lb. .28.00

Rhodium—(Metallic), per gram. .5.00

Ruthenium—(Metallic), per gm. .5.50

Rubidium—(Metallic), per gram. 2.00

Selenium—(Metallic), per oz. .1.80

Sodium—(Metallic), per lb. .2.50

Strontium—(Metallic), per gram. .60

Tantalum (Metallic), per gram. 9.00

Telurium—(Metallic), per lb. .5.00

Thallium—(Metallic), per gram. .25

Titanium—(Metallic), per gram. 2.25

Thorium—(Metallic), per gram. 17.00

Tungsten—(Metallic), per oz. .2.25

Uranium—(Metallic), per lb. .5.00

Vanadium—(Metallic), per gm. .22.00

Yttrium—(Metallic), per gram. .9.00

Zirconium—(Metallic), per oz. .65.00

BUILDING MATERIAL.

Bricks—Pale, ℔ 1,000 .3.00@3.50
Jerseys, ℔ 1,000 .4.75@5.25
Up Rivers, ℔ 1,000 .5.00@5.50
Haverstraw seconds, ℔ 1,000 .5.50@6.00
Haverstraw firsts, ℔ 1,000 .6.00@6.25
Fronts, nominal, ℔ 1,000 .
Croton .11.00@16 00
Wilmington .20.00@21.00
Philadelphia .@22 00
Trenton .@22.00
Baltimore .

Building Stone—Amherst freestone, ℔ cu. ft. .95@1.00
Brownstone, ℔ cu. ft. .1.00@1.35
Granite, rough, ℔ cu. ft. .45@1.25
Granite, Scotch, ℔ cu. ft. .1.00@1.15

Cement—Rosendale, ℔ bbl. .85@1.10
Portland, American, ℔ bbl. .2.15@2.45
Portland, foreign, ℔ bbl. .2.40@2.50
Portland, " special brands 2.60@2.85
Roman, ℔ bbl. .2.75@2.90
Keene's coarse, ℔ bbl. .4.50@5.50
Keene's fine, ℔ bbl. .7.25@8.50

Slate—Purple and green roofing, ℔ 100 ft. .7.00@7.50
Red roofing, ℔ 100 sq. ft. .12.00
Black roofing, ℔ 100 sq. ft. .4.25@5.50

Lime—Rockland, common, ℔ bbl. .90
Rockland, finishing, ℔ bbl. .1.10
St. John, com. and finish., ℔ bbl. .85@ .90
Glens Falls, com. and fin., ℔ bbl. .85@1.10

Labor—Ordinary, ℔ day. .1.50@2.00
Masons, ℔ day. .4.00
Plasterers, ℔ day. .4.00
Carpenters, ℔ day. .3.50
Plumbers, ℔ day. .3.50
Painters, ℔ day. .2.50@3.50
Stonesetters, ℔ day. .3.50@4.00
Tilelayers, ℔ day. .3.50@4.50
Bricklayers, ℔ day. .4.00